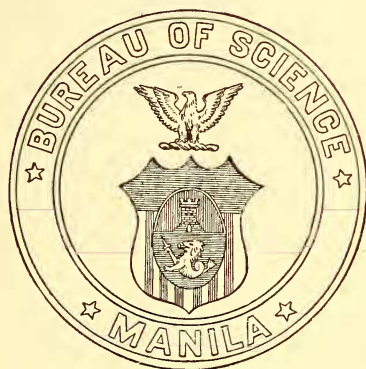


THE LIZARDS OF THE PHILIPPINE ISLANDS

BY

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THE LIZARDS OF THE PHILIPPINE ISLANDS

By EDWARD H. TAYLOR

INTRODUCTION

This account of the lizards of the Philippine Islands is based primarily on the collection of the Bureau of Science, taken in various parts of the Archipelago since 1898. The collection, while not extensive, contains a number of type specimens, most of which have been described in the Philippine Journal of Science.*

Examination of the herpetological collections of the Ateneo de Manila was made possible to me through the kindness of the Director, Rev. Father Sola. The snake collection is representative of the Philippine snake fauna and contains many rare forms and most of the commoner ones. The lizard collection is neither so extensive nor so representative. Rev. Father Llanos kindly permitted me to study the collections in the University of Santo Tomás, Manila, and to describe two species new to science. These are *Brachymeles eleræ* Taylor and *Sphenomorphus llanosi* Taylor, the types of which remain in the Santo Tomás collection. Some of the specimens reported by Cásto de Elera † as being in the university collection are not to be found there now. In consequence there is still some doubt as to the authenticity of certain of his records.

My own collection, consisting of about 2,500 specimens, made during 1912 to 1916, contains for the most part specimens from central Mindanao and Negros, collected during my residence in those islands, with smaller collections from Mindoro, Luzon, Panay, and Balabac. I am indebted to Mr. Homer McNamara, formerly of the Bureau of Agriculture, for a collection made at La Carlota, Occidental Negros; to Mr. Archie Howard, of the Bureau of Education, for a small but interesting collection from Panay; and to Mr. Clark Burks, of Sumagui, Mindoro, for a collection from that locality.

It is a matter of great regret that I have been unable to examine Philippine material contained in European museums. For the most part the collections in Europe, notably those of the

* Taylor, Philip. Journ. Sci. § D 10 (1915) 89-110.

† Cat. Fauna Filipinas 1 (1895) 399-454.

British Museum and the Senckenberg Museum, have been studied and reported on by able herpetologists. I have, with few exceptions, accepted their identifications without question.

HISTORICAL

In passing it will be interesting to note some of the more important collections that have been made in the Islands. Probably the earliest noteworthy collection is that made by Hugh Cuming in 1836-1840. The following types were collected:

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|-------------------------------------|--|
| <i>Luperosaurus cumingii</i> Gray. | <i>Varanus grayi</i> Boulenger. |
| <i>Draco ornatus</i> (Gray). | <i>Mabuya multicarinata</i> (Gray). |
| <i>Draco bimaculatus</i> Günther. | <i>Sphenomorphus fasciatus</i> (Gray). |
| <i>Gonyocephalus sophiæ</i> (Gray). | <i>Otosaurus cumingii</i> Gray. |
| <i>Varanus rudicollis</i> (Gray). | <i>Leiopisma pulchellum</i> (Gray). |
| <i>Varanus cumingi</i> Martin. | <i>Tropidophorus grayi</i> Günther. |
| ("Isle of Mindanao.") | <i>Brachymeles bicolor</i> (Gray). |

Unfortunately the exact type localities of all except one of these species are no longer known, most of them bearing the record "Philippines." Specimens of all of them have been taken in the Islands in more recent times, with the exception of *Luperosaurus cumingii*, of which it appears that only the two type specimens, an adult female and a half-grown specimen, have ever been found. Besides the type specimens listed, Cuming collected several other species which seem to be among the earliest, if not the first, captures recorded for the Islands. Among them the following are noteworthy:

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|--|---------------------------------------|
| <i>Varanus nuchalis</i> (Günther). | <i>Gekko gecko</i> (Linnæus). |
| ("Cataguan.") | <i>Dasia olivaceum</i> (Gray). |
| <i>Brachymeles schadenbergi</i> (Fischer). | (Type of <i>Tiliqua grisea</i> Gray.) |
| <i>Brachymeles gracilis</i> (Fischer). | <i>Emoia atrocostatum</i> (Lesson). |
| <i>Sphenomorphus jagorii</i> (Peters). | (Type of <i>Mococa cumingii</i> .) |
| <i>Draco spilopterus</i> (Wiegmann). | |

The first four are undoubtedly the earliest recorded specimens of these species captured, but they were not recognized as new by Gray, who appears to have been the first to examine the collection. It was not until much later that the types were described.

It is quite possible, but not certain, that Cuming collected the first specimens taken in the Philippines of the following:

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| <i>Calotes marmoratus</i> (Gray). | <i>Cosymbotus platyurus</i> (Schneider). |
| <i>Draco reticulatus</i> Günther. | <i>Gekko monarchus</i> (Duméril and Bibron). |
| <i>Gymnodactylus philippinicus</i> Steindachner. | <i>Varanus salvator</i> (Laurenti). |
| <i>Hemidactylus garnotii</i> Duméril and Bibron. | ("Cataguan.") |
| | <i>Mabuya multifasciata</i> Kuhl. |

The last-named species are represented in the collection of the British Museum from the locality "Philippines," but the collector is not recorded in Boulenger's lists of specimens. It is known that certain of Cuming's specimens were collected at "Cataguan," namely, *Varanus nuchalis*; so that *Varanus salvator* from this locality may without a reasonable doubt be considered with his collection.

Thus we have, as a result of Cuming's work, seventeen species new to science; of these thirteen were made types of legitimate species, and four, that were not recognized until much later as distinct, were wrongly classified with other species. Besides these seventeen species, four others were taken that were not new to science. Two, however, were made types of new species by Gray, but these have been referred by later herpetologists to other already known species. Whether Cuming collected the types of *Calotes marmoratus* (Gray), *Draco reticulatus* Günther, and the earliest specimens of *Gymnodactylus philippinicus* Steindachner may be doubted, but it is highly probable that he did. It is certain that his collection was the earliest considerable Philippine collection to reach London. At least the first and the last species were examined by Gray prior to the publication of his Catalogue in 1845. If Cuming did not collect specimens of the common species, *Gekko monarchus* (Duméril and Bibron) and *Cosymbotus platyurus* (Schneider), it is a matter of wonder. However, there is no published evidence to show that he collected *Peropus mutilatus* (Wiegmann) or *Hemidactylus frenatus* Duméril and Bibron, which are certainly quite as common as the two species just mentioned.

A small herpetological collection was obtained by the Wilkes Exploring Expedition, 1838 to 1842, when it visited the Philippines. The type of *Leiopisma vulcanium* (Girard) was obtained at Caldera, Zamboanga, Mindanao; and specimens of *Emoia cyanurum* (Lesson), which appear to be the first record of this species for the Philippines. *Peropus mutilatus* (Wiegmann) and *Gekko gecko* (Linnæus) were also obtained.

A small collection made in the Philippine Islands by M. Hombron and M. Jacquinot, surgeons of the *Astrolabe* and *Zélée*, during the expedition of these ships to the South Pole, contained the type of *Perochirus ateles* (A. Duméril).

The second considerable collection of reptiles was made some time during 1859 to 1861 by a European traveler, Friederich Jagor. This collection was studied by Peters, who reported on it in 1864. It contained the types of *Sphenomorphus jagorii*

(Peters), from Samar and Leyte; *Sphenomorphus acutus* (Peters), from Samar; and *Euprepes bitæniatus* Peters. The last species is now regarded as a synonym of *Emoia atrocostatum* (Lesson). The collection of snakes made by Jagor was very much more important than that of lizards.

The third important collection is that obtained during 1858 to 1866 by Dr. Karl Semper, who came to the Islands for the first time in 1858. From 1859 to 1861 he traveled through the Philippine Archipelago, in 1862 he was in the Pelew Islands, in 1863 in Bohol, and during 1864 in Mindanao. He returned to Europe in 1866, and the lizard collections were reported upon by Peters in 1867. In the collection the following types are found:

- Lepidodactylus labialis* (Peters); Mindanao.
- Draco reticulatus cyanopterus* Peters; Mindanao.
- Gonyocephalus semperi* (Peters); "Philippines."
- Sphenomorphus variegatus* (Peters); Mindanao.
- Leiopisma semperi* (Peters); Mindanao.
- Siaphos quadrivittatum* (Peters); Mindanao.
- Dasia semicincta* Peters; Mindanao.

Besides these seven new species, he discovered a specimen of what is probably *Calotes marmoratus* (Gray), which Peters made the type of a new species, *Calotes philippinus*.

The next collection of importance was that of Dr. Adolph B. Meyer, 1870 to 1873. A number of important specimens were taken, some of which apparently were sent to Berlin, while others found their way into the British Museum. The type of *Tropidophorus leucospilos* (Peters), Luzon, and specimens of other known species were obtained.

Mr. A. H. Everett, the noted English traveler-naturalist, collected widely throughout the Archipelago. His saurian collections were sent to the British Museum; they contained the following species:

- Draco guentheri* Boulenger; Philippines. Type.
- Draco everetti* Boulenger; Mindanao and Dinagat. Type.
- Gymnodactylus philippinicus* Steindachner; Dinagat.
- Hemidactylus frenatus* Duméril and Bibron; Palawan.
- Cosymbotus platyurus* (Schneider); Dinagat.
- Draco volans* Linnæus; Palawan.
- Draco ornatus* (Gray); Dinagat.
- Draco spilopterus* (Wiegmann); "S. Negros."
- Draco bimaculatus* Günther; Dinagat.
- Calotes cristatellus* (Kuhl); Palawan.
- Varanus nuchalis* (Günther); "S. Negros."
- Varanus cumingi* Martin; Mindanao.
- Varanus salvator* (Laurenti); Palawan.
- Sphenomorphus acutus* (Peters); Dinagat.
- Otosaurus cumingii* Gray; Dinagat.

Mr. John Whitehead made a trip to Palawan in 1885 during a sojourn in northern Borneo. The reptiles he collected were studied by Mocquard, whose report contained the first record for the Philippines of *Draco volans*. During 1890 to 1896 Whitehead made zoölogical collections in other Philippine islands, where the types of two new lizards were taken; namely *Sphenomorphus decipiens* (Boulenger), from Isabela Province, Luzon; and *Sphenomorphus luzonensis* (Boulenger), from "Mt. Benguet," Luzon. These were obtained for the British Museum.

Dr. O. Fr. von Moellendorff made reptile collections in various parts of the Archipelago, which were sent to the Senckenberg Museum, at Frankfort. His specimens have been reported upon by Dr. O. Boettger. Types were collected of *Lepidodactylus brevipes* Boettger, Samar, 1897, and *Sphenomorphus moellendorffi* (Boettger), Tablas. It is known that a number of the specimens in the Moellendorff collections were actually collected by José Florencio Quadras and Dr. Leon Guerrero.

A small collection from the Calamian Islands, sent to Dresden by A. Schadenberg, of Manila, contained a specimen of *Lygosoma chalcides* (Linnæus), which is the first record for the Islands of this species.

Boettger mentions a collection of Philippine reptiles belonging to B. Schmacker, Shanghai, China, containing several specimens from Mindoro. Of the Philippine specimens in this collection, I know nothing further than what has been recorded by Boettger.

Prof. J. B. Steere collected the type of *Sphenomorphus steerei* Stejneger, in Guimaras Island.

A few small collections made in the Philippines since American occupation have found their way into the United States National Museum. Among these are the collections of Mr. Richard C. McGregor, ornithologist of the Bureau of Science, who collected in the Babuyan group in 1903. On Calayan he collected the type of *Luperosaurus macgregori* Stejneger and specimens of:

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|-------------------------------------|--|
| <i>Mabuya multicarinata</i> (Gray). | <i>Hemidactylus frenatus</i> Duméril and Bibron. |
| <i>Dasia smaragdinum</i> (Lesson). | |
| <i>Sphenomorphus jagori</i> Peters. | <i>Gekko monarchus</i> (Duméril and Bibron). |
| <i>Emoia atrocostatum</i> (Lesson). | |

Dr. Edgar A. Mearns sent to the United States National Museum with his other collections a number of lizards, among which were the types of *Draco mindanensis* Stejneger, from Mindanao; *Sphenomorphus atrigularis* Stejneger, from "Catagan," Mindanao; and *Tropidophorus misaminius* Stejneger, from "Catagan," Mindanao. These are still known only from the type specimens. They were collected in 1906.

The collections of reptiles made in Mindanao in 1908 by Maj. J. M. T. Partello resulted in the discovery of the new and striking *Tropidophorus partelloi* Stejneger, at Cotabato, Mindanao. This species is still known only from the type.

Dr. J. B. Thompson, surgeon of the United States Battleship *Cincinnati*, made collections of reptiles which were sent to Stanford University. No new lizards were described from the Philippine material.

The collections I made in the Islands from 1912 to 1917 resulted in the discovery of the following new species and subspecies:

- Gymnodactylus annulatus* Taylor; Agusan, Mindanao.
- Gymnodactylus agusanensis* Taylor; Agusan, Mindanao.
- Hemidactylus luzonensis* Taylor; Manila, Luzon.
- Hemiphyllodactylus insularis* Taylor; Sumagui, Mindanao.
- Lepidodactylus aureolineatus* Taylor; Agusan, Mindanao.
- Lepidodactylus christiani* Taylor; Mount Canlaon, Negros.
- Lepidodactylus naujanensis* Taylor; Lake Naujan, Mindoro.
- Lepidodactylus divergens* Taylor; Little Govenen Island, Sulu.
- Luperosaurus joloensis* Taylor; Jolo.
- Gekko mindorensis* Taylor; Mindoro.
- Ptychozoon intermedia* Taylor; Agusan, Mindanao.
- Sphenomorphus jagorii divergens* subsp. nov.; Mindoro.
- Sphenomorphus jagorii grandis* subsp. nov.; Mount Canlaon, Negros.
- Sphenomorphus jagorii palustris* Taylor; Agusan, Mindanao.
- Sphenomorphus cori* Taylor; Agusan, Mindanao.
- Sphenomorphus arborens* Taylor; Mount Canlaon, Negros.
- Sphenomorphus mindanensis* Taylor; Agusan, Mindanao.
- Sphenomorphus curtirostris* Taylor; Agusan, Mindanao.
- Sphenomorphus biparietalis* Taylor; Sulu.
- Leiolopisma pulchellum grande* Taylor; Mount Canlaon, Negros.
- Emoia ruficauda* Taylor; Agusan, Mindanao.
- Siaphos auriculatum* Taylor; Mount Canlaon, Negros.
- Siaphos kempfi* Taylor; Lake Naujan, Mindoro.
- Tropidophorus rivularis* Taylor; Agusan, Mindanao.
- Brachymeles burksi* Taylor; Sumagui, Mindoro.
- Brachymeles suluensis* Taylor; Bubuan Islands, Sulu.
- Brachymeles vermis* Taylor; Sulu.
- Dibamus argenteus* Taylor; Agusan, Mindanao.

The following species were discovered for the first time in the Philippine Islands and reported by me:

- Lepidodactylus woodfordi* Boulenger; Sulu.
- Mabuya rudis* (Boulenger); Sulu.
- Siaphos infralineolatum* (Günther); Mindanao.
- Riopa bowringii* (Günther); Jolo.

I have described as new the following species taken in the Philippine Islands by other collectors:

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| <i>Pseudogekko compressicorpus</i> (Taylor). | <i>Brachymeles eleræ</i> Taylor. |
| <i>Sphenomorphus llanosi</i> Taylor. | <i>Sphenomorphus lednickyi</i> Taylor. |
| | <i>Dasia olivaceum griffini</i> Taylor. |

On page 28 is given a table showing the chronological order in which the types of Philippine species were described.

BIBLIOGRAPHY OF PHILIPPINE LIZARDS

Only titles that have a direct value in the systematic study of the Philippine forms have been included in this list. Other works contain references to Philippine lizards, but practically none of them has any original systematic data.

BARBOUR, THOMAS. A contribution to the zoögeography of the East Indian Islands. Mem. Mus. Comp. Zool. Harvard College 44 (1912) 1-203; 8 plates.

This is an excellent work on faunal relationships of the Malay Archipelago and the East Indian Islands, with an annotated list of herpetological specimens collected or studied. There is appended a long series of tables of distribution, which include species known to this territory. From the Philippines are listed twenty-one frogs, including *Rana signata* Günther and *Rana chalconota* Schlegel; eighteen lizards, including *Ptychozoon horsfieldii*; twenty-six snakes; one turtle.

BOETTGER, OSKAR. Katalog der Reptilien-Sammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main. I. Theil. (Rhynchocephalen, Schildkröten, Krokodile, Eidechsen, Chamaeleons.) (1893) 140.

Three genera, eight new species, and one new variety are described. *Draco quadrasi* Boettger is described from Sibuyan Island, Philippine Islands.

BOETTGER, OSKAR. Neue Reptilien und Batrachier von den Philippinen. Zool. Anz. 20 (1897) 161-166.

Lepidodactylus brevipes, from Samar, and *Lygosoma* (*Homolepida*) *moellendorffi* (= *Sphenomorphus moellendorffi*) Boettger, from Tablas, are the new lizards described. Two new snakes, *Typhlops ruber* and *Ablabes philippinus*, and a frog, *Calophrynus acutirostris* (= *Kalophrynus acutirostris*), are also described.

BOETTGER, OSKAR. Aufzählung der von den Philippinen bekannten Reptilien und Batrachier. Ber. Senck. Natur. Ges. (1886) 91-134.

This paper is a check list of the turtles, crocodiles, lizards, snakes, and frogs known from the Philippines. It lists the following: Five species of turtles belonging to five genera and three families; two species of crocodiles belonging to one genus;

forty-eight species of lizards (including two subspecies) belonging to eighteen genera and four families. The lizards are distributed as follows: Geckonidæ, 8 genera, 11 species; Agamidæ, 4 genera, 12 species; Varanidæ, 1 genus, 5 species; Scincidæ, 5 genera, 20 species. Eighty-five species of snakes belonging to forty genera and eighteen families are listed. This paper was written subsequent to the publication of Boulenger's Catalogue of Lizards, and only a single species and two subspecies of lizards are listed other than those given in Boulenger's work.

BOULENGER, G. A. On the geckos of New Caledonia. Proc. Zool. Soc. London (1883) 116-131; pls. 21 and 22.

Mentions *Hemidactylus garnotii* Duméril and Bibron as occurring in the Philippine Islands and gives figure of foot (pl. 22).

BOULENGER, G. A. Catalogue of the Lizards in the British Museum of Natural History, ed. 2, 1 (1885) i-xii + 1-436, pls. 1-32; 2 (1885) i-xiii + 1-498, pls. 1-24; 3 (1887) i-xii + 1-575, pls. 1-40.

This is a monographic catalogue of the lizards of the world, based on British Museum collections. Volume 1 contains descriptions of the following new species from the Philippines: *Draco guentheri*, *Draco everetti*, and *Gonyocephalus interruptus*; eighteen other Philippine species are listed. Five species are figured. Volume 2 describes *Varanus grayi* and lists four other species from the Philippines. Volume 3 lists twenty-one species from the Philippines, five of which are splendidly figured. A total of forty-seven species is listed in this work, four of which are described for the first time. Ten species are figured.

BOULENGER, G. A. On the herpetological fauna of Palawan and Balabac. Ann. and Mag. Nat. Hist. VI 14 (1894) 81-90.

One turtle, seven lizards, sixteen snakes, and thirteen frogs are listed.

BOULENGER, G. A. Second report on additions to the lizard collection in the Natural-History Museum. Proc. Zool. Soc. London (1894) 722-736, pls. 47-49.

Draco quadrasii Boettger (type specimen) is reported; *Lygosoma luzonense* and *Lygosoma decipiens*, both collected by Whitehead in northern Luzon, are described as new. Complete drawings of both species, with head figures, are shown on plate 49. These species are treated under *Sphenomorphus* in the present work.

BOULENGER, G. A. A catalogue of the reptiles and batrachians of Celebes, with special reference to the collections made by Drs. P. and F. Sarasin in 1893-1896. Proc. Zool. Soc. London (1897) 193-237; pls. 7-16.

A list is given of species occurring in the Philippines which are also common to Celebes. A discussion of the faunal relations is added.

CASTO DE ELERA. Catálogo sistemático de toda la fauna de Filipinas conocida hasta el presente, y a la vez el de la colección zoológica del Museo de PP. Dominicos del Colegio-Universidad de Sto. Tomás de Manila. Manila, Imprenta del Colegio de Santo Tomás (1895-1896) 3 vols. Volume 1 (1895), Vertebrados, devotes pages 399 to 454 to a list of the crocodilians, batrachians, turtles, lizards, and snakes. Among the

sixty-one species of lizards listed the following records have not been authenticated:

Gymnodactylus marmoratus Duméril and Bibron.

Gymnodactylus consobrinus Peters.

Gymnodactylus platyurus White.

Hemidactylus maculatus Gray (may = *Hemidactylus luzonensis* Taylor; one specimen is at present in the collection at Santo Tomás).

Gecko vittatus bivittatus Gray.

Draco spilonotus Günther.

Draco dussumieri Duméril and Bibron.

Draco quinquefasciatus Gray.

Egernia cunninghami Gray.

Calotes ophiomachus Gray.

The catalogue states that there are specimens of almost all of these species in Santo Tomás. I am unable to find any of these species in the collection, with the exception of the final one. A specimen of *Calotes ophiomachus* is present in the collection, labeled "Filipinas." but this, I suspect, was collected at a southern Asiatic seaport by some priest en route to the Islands from Spain.

COPE, EDWARD DRINKER. Observations on reptiles of the old world. Proc. Acad. Nat. Sci. Philadelphia (1868) 316-323.

Describes *Hemidactylus longiceps* (= *Hemidactylus frenatus* Duméril and Bibron) from Manila.

DE ROOIJ, NELLY. The reptiles of the Indo-Australian Archipelago. Vol. 1, Lacertilia, Chelonia, Emydosauria, with 132 illustrations. Vol. 2, Ophidia. Leiden (1915).

Describes species known to occur in the Indo-Australian Archipelago. Boulenger has been followed, as a rule, in classification.

DUMÉRIL, AUGUSTE. Description des reptiles nouveaux ou imparfaitement connus de la collection du Museum d'Histoire Naturelle et remarques sur la classification et les caracteres des reptiles. Arch. Mus. Hist. Nat. Paris 8 (1855-1856) 437-588.

Hemidactylus ateles (= *Perochirus ateles*) is described and figured as new, from Zamboanga.

FISCHER, J. G. A list of reptiles and batrachians of Mindanao. Jahrb. d. wiss. Anst. Hamburg 2 (1885) 80, 81.

Two lizards and two snakes are described; namely, *Brachymeles gracilis*, *Brachymeles schadenbergi*, *Geophis schadenbergi*, and *Trimeresurus schadenbergi*. About five other lizards are included, at least two of which are wrongly named. These are *Hemidactylus cocteauvi* (= *peropus mutilatus* Wiegmann) and *Tiaris subcristata* (= *Gonycephalus interruptus* Boulenger). Twenty-three Philippine snakes and four frogs are listed. The identifications of frogs and snakes are not trustworthy.

FLOWER, STANLEY S. Notes on a second collection of reptiles made in the Malay Peninsula and Siam, from November, 1896, to September, 1898, with a list of the species recorded from those countries. Proc. Zool. Soc. London (1899) 600-966, pls. 36, 37.

A table showing the reptiles common to Siam and the Philippines is given on pages 602-608.

GIRARD, CHARLES. Proc. Acad. Nat. Sci. Philadelphia (1857) 196.

Describes *Leiopisma vulcanium* under the name of *Lipinia vulcania*.

GIRARD, CHARLES. United States Exploring Expedition during the Years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N., Vol. 20, Herpetology. With folio atlas. Philadelphia, J. B. Lippincott & Co. (1858) i-xvii + 1-496.

Lists two frogs, one snake, and five lizards from the Philippines.

Gekko gecko is beautifully figured, pl. 16, figs. 9-16.

GOGORZA Y GONZALES, JOSÉ D. Datos para la fauna Filipina. Vertebrados. Madrid, Imprenta de Fortaner (1888) 57 pages. [Extract from Anal. de la Soc. Esp. de Hist. Nat. 17 (1888).]

Eighty-seven reptiles and ten amphibians are listed.

GRAY, JOHN EDWARD. Catalogue of Lizards, ed. 1, London (1845).

The following Philippine species are described in this work:

Luperosaurus cumingi.

Dracunculus ornatus (= *Draco ornatus*).

Tiaris sophiæ (= *Gonyocephalus sophiæ*).

Bronchocela marmoratus (= *Calotes marmoratus*).

Uranus rudicollis (= *Varanus rudicollis*).

Otosaurus cumingi.

Hinulia fasciatum (= *Sphenomorphus fasciatus*).

Lipinia pulchellum (= *Leiopisma pulchellum*).

Tiliqua multicarinata (= *Mabuya multicarinata*).

Brachymeles bicolor.

Besides these new species the following Philippine species are recorded: *Peropus mutilatus* Wiegmann; *Uranus ornatus* (non Daudin = *Varanus grayi*) Boulenger; *Mococa cumingi* (= *Lygosoma atrocossatum*) Lesson; *Tiliqua grisea* (= *Dasia* species?); and *Keneuxia smaragdinum* (= *Dasia smaragdinum*).

GÜNTHER, A. Notes on some reptiles and batrachians obtained by Dr. Adolph Bernhard Meyer in Celebes and the Philippine Islands. Proc. Zool. Soc. London (1873) 165-172, pls. 17, 18.

Ten Philippine lizards are listed, with copious notes. A drawing of the head of *Sphenomorphus jagori* Peters is given under the name of *Hinulia variegata*. The snakes *Oligodon notospilus*, from Mindanao, and *Zaocys luzonensis*, from Luzon, are described as new. *Hologerrhum philippinum* Günther and *Oligodon notospilus* are figured by complete drawings, and *Pseudorhabdium oxycephalum* Günther by three text figures under the name *Oxycalamus oxycephalus*. A total of six snakes is listed. The frogs *Polypedates similis* (= *Rana similis*) Günther and *Platymantis meyeri* (= *Cornufer meyeri*) Günther are described as new from Laguna de Bay.

GÜNTHER, A. On two species of *Hydrosaurus* from the Philippine Islands. Proc. Zool. Soc. London (1872) 145 and 146, pls. 7, 8.

Discusses *Varanus cumingi* Martin and describes *Hydrosaurus nuchalis* (= *Varanus nuchalis*), showing splendid figures of the heads of both species.

GÜNTHER, A. On the reptiles and amphibians of Borneo. Proc. Zool. Soc. London (1872) 586-600, pls. 35-40.

Reports specimens of *Tiaris sophiæ* = (*Gonyocephalus sophiæ* Gray) from the Philippines with drawing of the head, fig. c, pl. 37.

GÜNTHER, A. Second list of Siamese reptiles. Proc. Zool. Soc. London (1861) 187-189.

Tropidophorus grayi described as new from specimens referred by Gray to *Tropidophorus cocincinensis* Cuvier.

GÜNTHER, A. List of the mammals, reptiles, and batrachians sent by Mr. Everett from the Philippine Islands. Proc. Zool. Soc. London (1879) 74-79, pl. 4.

Lists one tortoise, one crocodile, twenty lizards, seventeen snakes, and seven frogs. Among the Philippine lizards are listed *Draco cornutus* Günther (which is probably *Draco everetti* Boulenger), *Hinulia variegata* Peters (= *Brachymeles gracilis* Fischer), and *Euprepes rufescens* Shaw (*Mabuya multifasciata* Kuhl). Note is made of the variations in *Lophura amboinensis* Schlosser (= *Hydrosaurus pustulosus* Eschscholtz). A new genus of snakes, *Typhlogeophis*, is described with *T. brevis* as the type. *Dendrophis philippinensis* is described as new. This is a *Dendrelaphis*, and probably a variety of *D. terrificus*.

MARTIN, W. On two specimens of saurian reptiles sent to the society by Mr. Cuming. Proc. Zool. Soc. London (1838) 68-70.

Describes *Varanus cumingi* and records *Lophura amboinensis* Schlosser, from the Philippines.

MOCQUARD, M. F. Recherches sur la faune herpétologique des îles de Bornéo et de Palawan. Nouv. Arch. Mus. Hist. Nat. III 2 (1890) 115-165, pls. 7-11.

A résumé of the literature of Bornean and Palawan faunas, with descriptions of the collections made in Borneo, principally on Kina-balau, and in Palawan, by Whitehead, an English naturalist. Four lizards, one snake, and four frogs are listed from Palawan. One frog, *Ixalus nubilus*, is described as new. This species has been referred to *Staurois natator* Günther by Boulenger, Ann. and Mag. Nat. Hist. VI 14 (1894) 87.

MÜLLER F. Katalog der herpetologischen Sammlung des Basler Museums, (1878).

Draco fimbriatus, part, (= *Draco ornatus* Gray), is listed.

MÜLLER, F. I. Nachtrag Catalog der herpetologischen Sammlung des Basler Mus. (1880); II. Nachtrag Cat. Herp. Samml. Basler Mus. (1882); III. Nachtrag Cat. Herp. Samml. Basler Mus. (1883); IV. Nachtrag Cat. Herp. Samml. Basler Mus. (1885).

In the fourth paper *Mabuya multifasciata lateropunctata* is described from Luzon. This subspecies is probably only a normal female of the species. In the catalogue and the various supplements a few species of Philippine lizards are listed.

PARENTI P., and PICAGLIA, L. Rettili ed anfibi raccolti da P. Parenti nel viaggio di circumnavigazione della r. coruetta "Vettor Pisani" negli anni 1882-85, e da "V. Ragazzi" sulle coste del mar rosso e dell' America meridionale negli anni 1879-84. Atti. Soc. Mod. Mem. Orig. III 5 (1886) 1-96.

This paper lists a number of reptiles from Ticao. Many of the identifications are very untrustworthy. The following species are listed:

Hemidactylus frenatus Duméril and Bibron.

Spathoscalabotes mutilatus Günther (= ? *Hemiphyllodactylus insularis* Taylor).

Lophura amboinensis Schlosser.

Gecko japonicus (= ?).

Monitor chlorostigma (= ?).

Dendrophis punctulata Gray (= ?).

Dendrophis philippinensis Günther (= *Dendrelaphis* species).

Dendrophis octolineata (= *Dendrelaphis terrificus* Peters).

Rhacophorus maculatus Gray (= *Polypedates leucomystax* Gravenhorst).

PETERS, W. Ueber die Eidechsenfamilie der Scincoiden, insbesondere über die Schneider'schen, Wiegmann'schen und neue Arten des Zoologischen Museums. Mon. Berl. Ak. (1864) 44-58.

The following Philippine species are described as new:

Euprepes subgen. *Mabuya* Gray, *Eumeces* Duméril and Bibron (non Wiegmannn) *bitæniatus* (= *Emoia atrocostatum* Lesson), from Paracale, Luzon, and Catbalogan, Samar.

Lygosoma (*Hinulia*) *jagorii* (= *Sphenomorphus jagorii* Peters), from Samar and Leyte.

Lygosoma (*Hinulia*) *acutum* (= *Sphenomorphus acutus* Peters), from Loquilocum, Samar.

PETERS, W. Herpetological notes. Mon. Berl. Ak. (1867) 13-37.

The following species are described from the Philippines from the collection of Carl Semper:

Gecko labialis (= *Lepidodactylus labialis*) Peters.

Draco reticulatus cyanopterus (very probably *D. everetti* Boulenger).

Lophyrus (*Tiaris*) *semperi* (= *Gonyocephalus semperi* Peters).

Calotes (*Bronchocele*) *philippinus* (= *Calotes marmoratus* Gray).

Lygosoma (*Lipinia*) *semperi* (= *Leiolopisma semperi* Peters).

Lygosoma (*Cophoscincus*) *quadrivittatum* (= *Siaphos quadrivittatum* Peters).

Lygosoma (*Hinulia*) *variegatum* (= *Sphenomorphus variegatus* Peters).

Euprepes (*Tiliqua*) *semicinctus* (= *Dasia olivaceum semicincta* Peters).

One snake, *Dipsas philippina* (= *Boiga philippina* Peters, is described from the Islands. Three frogs, *Ixalus acutirostris* (= *Philautus acutirostris*).

Leptomantis bimaculata, and *Hylopleisia brevis* (= *Bufo brevipes*) are described.

PETERS, W. Ueber eine neue von Hr. Dr. A. B. Meyer auf Luzon entdeckte Art von Eidechsen (*Lygosoma* (*Hinulia*) *leucospilos*) und eine von demselben in Nordcelebes gefundene neue Schlangengattung, *Allophis nigricaudus*. Mon. Berl. Ak. (1872) 684-687.

Tropidophorus leucospilos is described as new.

STEJNEGER, LEONHARD. Three new frogs and one new gecko from the Philippine Islands. Proc. U. S. Nat. Mus. 28 (1905) 343-348.

Rana mearnsi, *Cornufer worcesteri*, *Philautus woodi* are the three frogs. *Lepidodactylus planicaudus* is the new lizard described.

STEJNEGER, LEONHARD. A new geckoid lizard from the Philippine Islands. Proc. U. S. Nat. Mus. 33 (1908) 545 and 546.

- Luperosaurus macgregori* is described as new from Calayan Island, Babuyan Islands, north of Luzon. The paper gives a short list of other lizards taken by R. C. McGregor on Calayan and Fuga Islands.
- STEJNEGER, LEONHARD. A new species of flying lizard from the Philippine Islands. *Proc. U. S. Nat. Mus.* 33 (1908) 677-679.
- Draco mindanensis* is described as new from Mount Malindang, Mindanao, collected by Maj. E. A. Mearns.
- STEJNEGER, LEONHARD. Three new species of lizards from the Philippine Islands. *Proc. U. S. Nat. Mus.* 34 (1908) 199-204.
- Sphenomorphus atrigularis*, *Sphenomorphus steerei*, and *Tropidophorus misaminius* are described as new. The first and last are from Mindanao; *S. steerei* is from Guimaras Island.
- STEJNEGER, LEONHARD. A new scincoid lizard from the Philippine Islands. *Proc. U. S. Nat. Mus.* 39 (1911) 97-98.
- Tropidophorus partelloi* is described from Cotabato Province, Mindanao.
- STOLICZKA, F. Observations on some Indian and Malayan Amphibia and Reptilia. *Journ. As. Soc. Bengal* 39 (1870) 134-228.
- Tiliqua olivaceum* is listed from the Philippines.
- STEINDACHNER, F. Reise der österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorff-Urbair. Zoologischer Theil. Reptilien, Wien (1867), 4to pp. 98, 3 plates; Amphibien, Wien (1867), 4to pp. 70, 5 plates.
- One new species, *Gymnodactylus philippinicus*, is described and a few others are listed from the Philippines.
- TAYLOR, EDWARD H. New Philippine lizards. *Philip. Journ. Sci.* § D 10 (1915) 89-110, pl. 1, figs. 1-12.
- The following new species are described: *Gymnodactylus annulatus*, *Gymnodactylus agusanensis*, *Ptychozoon intermedia*, *Lepidodactylus aureolineatus*, *Emoia ruficauda*, *Sphenomorphus mindanensis*, *Sphenomorphus coxi*, *Sphenomorphus curtirostris*, *Sphenomorphus palustris*, *Tropidophorus rivularis*, and *Dibamus argenteus* from Mindanao; *Hemidactylus luzonensis* and *Luperosaurus compressicorpus* (= *Pseudogekko compressicorpus* Taylor) from Luzon; *Dasia griffini* from Palawan.
- TAYLOR, EDWARD H. *Brachymeles*, a genus of Philippine lizards. *Philip. Journ. Sci.* § D 12 (1917) 267-278, pl. 1, figs. 1-6, text figs. 1-7.
- Six species of this genus are described and figured. *Brachymeles burksi*, from Mindanao, and *Brachymeles eleræ*, locality unknown, are new.
- TAYLOR, EDWARD H. Snakes and lizards known from Negros, with descriptions of new species and new subspecies. *Philip. Journ. Sci.* § D 12 (1917) 353-382; pls. 1, 2, text figs. 1, 2.
- Twenty-four snakes and twenty-four lizards are listed. Two new snakes and three new subspecies of snakes are described. The new lizards are *Lepidodactylus christiani*, *Sphenomorphus arborens*, *Siaphos auriculatum*, and *Leiolopisma pulchellum grande*, all from Mount Canlaon, Negros.
- TAYLOR, EDWARD H. Reptiles of the Sulu Archipelago. *Philip. Journ. Sci.* § D 13 (1918) 233-267, 3 plates, 11 text figures.

The following lizards are described as new: *Lepidodactylus divergens*, *Hemiphyllodactylus insularis*, *Luperosaurus joloensis*, *Sphenomorphus biparietalis*, *Brachymeles suluensis*, and *Brachymeles vermis*. A new snake, *Typhlops suluensis*, is described; and four lizard species are recorded for the first time from the Philippines; *Lepidodactylus woodfordi* Boulenger; *Mabuya rudis* (Boulenger); *Siaophos infralineolatum* (Günther); *Riopa bouringii* (Günther).

TAYLOR, EDWARD H. New or rare Philippine reptiles. Philip. Journ. Sci. 14 (1919) 105–125, 2 plates, 4 text figs.

Lepidodactylus naujanensis, from Mindoro; *Sphenomorphus llanosi*, locality unknown; *Sphenomorphus lednickyi*, from Masbate; and *Gekko mindorensis*, from Mindoro, are described as new. Several new species of *Typhlops* are described.

WERNER, F. Ueber neue oder seltene Reptilien des Naturhistorischen Museums in Hamburg. Mitt. Naturh. Mus. Hamburg 27 (1910) 1–45.

First record of *Draco cornutus* Günther for the Philippines, page 9; list of Philippine species of *Draco*, page 19.

LIST OF SPECIES OF LIZARDS ERRONEOUSLY ATTRIBUTED TO THE PHILIPPINE ISLANDS

- Cyrtodactylus marmoratus* Gray, reported by Gray, Cat. Liz. (1845) 173 = *Gymnodactylus philippinicus* Steindachner.
- Hemidactylus longiceps* Cope, Proc. Acad. Nat. Sci. Philadelphia (1868) 320 = *Hemidactylus frenatus* Duméril and Bibron.
- Hemidactylus cocteau* (Duméril and Bibron) Fischer, Jahrb. wiss. Anst. Hamburg 2 (1885) 80 = *Peropus mutilatus* (Wiegmann).
- Spathoscababotes mutilatus* Günther, Proc. Zool. Soc. London (1872) 594; Boulenger, Cat. Liz. Brit. Mus. (1885) 156, pl. 13, fig. 1 = *Hemiphyllodactylus typus* Bleeker.
- Platydictylus guttatus* Peters, Preuss. Exped. O. Asien, Zool. Teil 1 (1876) 374 = *Gekko gecko* (Linnæus).
- Gekko verus* Günther, Proc. Zool. Soc. London (1879) 76 = *Gekko gecko* (Linnæus).
- Draco fimbriatus* Kuhl (part) Müller, Cat. Herp. Samml. Basel. Mus. (1878) 634 = *Draco ornatus* (Gray).
- Dracontoides personatus* Fitzinger, Syst. Rept. (1843) 51 = *Draco spilopterus* (Wiegmann).
- Tiaris subcristata* Fischer, Jahrb. wiss. Anst. Hamburg 2 (1885) 80 = *Gonyocephalus interruptus* Boulenger.
- Tiaris belli* Gray, Cat. Liz. (1845) 240 = *Gonyocephalus sophiæ* (Gray).
- Tiaris petersii* Günther, Zool. Rec. 4, 136 = *Gonyocephalus sophiæ* (Gray).
- Calotes (Bronchocele) philippinus* Peters, Mon. Berl. Ak. (1867) 16.
- ?*Lophyrus spinosus* A. Duméril, Cat. Méth. Rept. 91 = *Calotes marmoratus* (Gray).
- Lophura amboinensis* (Schlosser) Boulenger, Cat. Liz. Brit. Mus. 1 (1885) 402 = *Hydrosaurus pustulosus* (Eschscholtz).
- Varanus ornatus* (Daudin) Gray, Cat. Liz. (1845) 10 = *Varanus grayi* Boulenger.
- Hydrosaurus marmoratus* Günther, Proc. Zool. Soc. London (1872) 145 = *Varanus nuchalis* (Günther) and *Varanus salvator* (Laurenti).
- Enoplosaurus insignis* Sauvage, Bull. Soc. Philom. 3 (1879) 211 = *Tropidophorus grayi* Günther.

Tropidosaurus cocincinensis Gray (part) = *Tropidophorus grayi* Günther.
Mocoa cumingii Gray, Cat. Liz. (1845) 81 = *Emoia atrocostatum* (Lesson).
Euprepes biteniatus Peters, Mon. Berl. Ak. (1864) 53 = *Emoia atrocostatum* (Lesson).

Euprepes cumingii Peters, Mon. Berl. Ak. (1867) 20 = *Emoia atrocostatum* (Lesson).

Euprepes otus Peters, Mon. Berl. Ak. (1867) 20 = *Otosaurus cumingii* Gray.
Hinulia variegata Günther, Proc. Zool. Soc. London (1873) 165, pl. 171, fig. B; (1879) 76 = *Sphenomorphus jagori* Peters.

Lygosoma naevium Peters and Doria, Ann. Genova 13 (1878) 340 = *Sphenomorphus variegatus* (Peters).

Eumeces carinatus var. Peters, Preuss. Exped. O. Asien. Zool. Teil 1 (1876) 376 = *Mabuya multicarinata* (Gray).

Euprepis ocellatus Bocourt Miss. Scient. an. Mexique (1879) 414, pl. 22c, fig. 8 = *Mabuya multifasciata* Kuhl.

The following have been reported from the Philippines, but it is impossible to determine the species with which they are synonymous. It is uncertain whether the identifications or the localities are incorrect.

Gecko japonicus (Duméril and Bibron) Parenti and Picaglia, Atti. Soc. Nat. Modena, Mem. Orig. III 5 (1886) 15. Reported from Ticao, P. I.

Calotes ophiomachus (Gray) Westphal-Castelnau, Cat. Coll. Rept., Montpellier (1870) 16; Casto de Elera, Cat. Fauna Filipinas 1 (1895) 416. There is a specimen of this species in Santo Tomás Museum, but it is very probably not of Philippine origin.

Hemidactylus maculatus Duméril and Bibron, Erp. Gén. 3 (1835) 358; and Casto de Elera, Cat. Fauna Filipinas 1 (1895) 409.

Gymnodactylus platyurus (White) Casto de Elera, Cat. Fauna Filipinas 1 (1895) 409. Reported from Paragua, Ynagauan.

Gymnodactylus consobrinus (Peters) Casto de Elera, Cat. Fauna Filipinas 1 (1895) 408.

Gecko vittatus (Houttuyn) Casto de Elera, Cat. Fauna Filipinas 1 (1895) 413, and var. *bivittatus*, from Luzon, Manila, Mindanao, Davao.

Draco spilonotus (Günther) Casto de Elera, Cat. Fauna Filipinas 1 (1895) 414. Reported from Paragua, Tagburus.

Draco dussumieri (Duméril and Bibron) Casto de Elera, Cat. Fauna Filipinas 1 (1895) 415. Reported from Luzon, Manila.

Draco quinquefasciatus (Gray) Casto de Elera, Cat. Fauna Filipinas 1 (1895) 415. Reported from Samar, Paranas, Calbayog.

Egernia cunninghami (Gray) Casto de Elera, Cat. Fauna Filipinas 1 (1895) 418. Reported from Paragua, Puerto Princesa.

Hinulia naevia Gray, Cat. Liz. (1845) 75 = *Lygosoma melanopogon* Duméril and Bibron.

Leiopisma telfairi (Desjard.) A. Duméril, Cat. Meth. Coll. Rept. Mus. Hist. Nat. Paris (1851) 175.

Monitor chlorostigma (Cuvier) Parenti and Picaglia, Atti. Soc. Nat. Modena, Orig. III 5 (1886) 26. From Ticao.

Plestiodon sinense (Duméril and Bibron) A. Duméril, Cat. Meth. Coll. Rept. Mus. Hist. Nat. Paris (1851) 164.

TABLE 1.—Philippine species of lizards in the chronological order in which the types were described.

| Type described. | Species. | Authority. | Collector. | Locality. | Collection date. | Remarks. |
|-----------------|--------------------------------------|--------------------|-----------------------|-------------------|------------------|---|
| 1829 | <i>Hadrosaurus pustulosus</i> . | Eschscholtz | (?) | Philippines | (?) | <i>Histiurus pustulosus</i> . |
| 1835 | <i>Peropus mutilatus</i> . | Wiegmann | Meyen | Manila | (?) | <i>Hemidactylus (Peropus) mutilatus</i> . |
| 1835 | <i>Draco spilopterus</i> | do | do | do | (?) | <i>Dracunculus spilopterus</i> . |
| 1838 | <i>Varanus cumingi</i> | Martin | H. Cuming | Mindanao | 1836-38 | |
| 1839 | <i>Brachymeles bonitæ</i> | Duméril and Bibron | (?) | Manila | (?) | |
| 1845 | <i>Luperosaurus cumingi</i> | Gray | H. Cuming | Philippines | 1836-40 | |
| 1845 | <i>Draco ornatus</i> | do | do | do | 1836-40 | |
| 1845 | <i>Gonyocephalus sophiæ</i> | do | do | do | 1836-40 | <i>Dracunculus ornatus</i> . |
| 1845 | <i>Varanus rudicollis</i> | do | do | do | 1836-40 | <i>Tiaris belli</i> and <i>Tiaris sophiæ</i> . |
| 1845 | <i>Mabuya multicarinata</i> | do | do | do | 1836-40 | <i>Uvaranus rudicollis</i> . |
| 1845 | <i>Sphenomorphus fasciatus</i> | do | do | do | 1836-40 | <i>Tiliqua multicarinata</i> . |
| 1845 | <i>Otosaurus cumingi</i> | do | do | do | 1836-40 | <i>Hinulia fasciata</i> . |
| 1845 | <i>Leiopisma pulchellum</i> | do | do | do | 1836-40 | |
| 1845 | <i>Brachymeles bicolor</i> | do | do | do | 1836-40 | <i>Lipinia pulchella</i> . |
| 1845 | <i>Calotes marmoratus</i> | do | H. Cuming | do | 1836-40 | <i>Senira bicolor</i> . |
| 1856 | <i>Perocirrus ateles</i> | Duméril | Hombon and Jacquinot. | "Samboangan" | (?) | <i>Bronchocelea marmorata</i> . <i>Hemidactylus ateles</i> . |
| 1857 | <i>Leiopisma vulcania</i> | Girard | Wilkes Expedition | Caldera, Mindanao | 1838-42 | <i>Lipinia vulcania</i> . |
| 1861 | <i>Tropidophorus grayi</i> | Günther | H. Cuming | Philippines | 1836-40 | |
| 1864 | <i>Sphenomorphus acutus</i> | Peters | F. Jagor | Samar | 1859-61 | <i>Lygosoma (Hinulia) acutum</i> . |
| 1864 | <i>Sphenomorphus jagori</i> | do | do | Samar and Leyte | 1859-61 | <i>Lygosoma (Hinulia) jagori</i> . |
| 1864 | <i>Draco bimaculatus</i> | Günther | H. Cuming | Philippines | 1836-40 | |
| 1864 | <i>Draco reticulatus</i> | do | do | do | 1836-40 | |
| 1867 | <i>Lepidodactylus labialis</i> | Peters | C. Semper | Mindanao | 1858-66 | <i>Gecko labialis</i> . |
| 1867 | <i>Draco reticulatus cyanopterus</i> | do | do | do | 1858-66 | |

| | | | | | | |
|------|--|--------------|------------------|-------------------------|---------|---|
| 1867 | <i>Gonyocephalus semperi</i> | do | do | Philippines | 1858-66 | <i>Lophyrus (Tiaris) semperi</i> . |
| 1867 | <i>Leiopisma semperi</i> | do | do | Mindanao | 1858-66 | <i>Lygosoma (Lipinta) semperi</i> . |
| 1867 | <i>Staphos quadrivittatum</i> | do | do | do | 1858-66 | <i>Lygosoma (Cophoscineus) quadrivittatum</i> . |
| 1867 | <i>Dasia semicincta</i> | do | do | do | 1858-66 | <i>Euprepes (Tiliqua) semicincta</i> . |
| 1867 | <i>Sphenomorphus variegatus</i> | do | do | do | 1858-66 | <i>Lygosoma (Hinulia) variegatum</i> . |
| 1869 | <i>Gymnodactylus philippinicus</i> | Steindachner | (?) | (?) | (?) | |
| 1872 | <i>Tropidophorus leucospilus</i> | Peters | A. B. Meyer | Luzon | 1870-73 | <i>Lygosoma (Hinulia) leucospilus</i> . |
| 1872 | <i>Varanus nuchalis</i> | Günther | H. J. Veitch | Philippines | (?) | <i>Hydrosaurus nuchalis</i> Günther. |
| 1885 | <i>Brachymeles gracilis</i> | Fischer | A. Schadenberg | Mindanao | (?) | <i>Riopa gracilis</i> . |
| 1885 | <i>Brachymeles schadenbergii</i> | do | do | do | (?) | <i>Riopa schadenbergii</i> . |
| 1885 | <i>Draco guentheri</i> | Boulenger | A. Everett | Philippines | | |
| 1885 | <i>Draco everetti</i> | do | do | Dinagat and Mindanao | | |
| 1885 | <i>Gonyocephalus interruptus</i> | do | G. Taylor | Mindanao | | |
| 1885 | <i>Varanus grayi</i> | do | H. Cuming | Philippines | 1836-40 | <i>Uranus ornatus</i> Gray. |
| 1893 | <i>Draco quadras</i> | Boettger | J. Quadras | Sibuyan | (?) | |
| 1894 | <i>Sphenomorphus decipiens</i> | Boulenger | J. Whitehead | Isabela, Luzon | 1890-96 | <i>Lygosoma decipiens</i> Boulenger. |
| 1894 | <i>Sphenomorphus luzonensis</i> | do | do | "Mt. Benguet," Luzon | 1890-96 | <i>Lygosoma luzonense</i> . |
| 1897 | <i>Lepidodactylus brevipes</i> | Boettger | Dr. Moellendorff | Samar | | |
| 1897 | <i>Sphenomorphus moellendorffi</i> | do | do | Tablas | | <i>Lygosoma (Homolepida) moellendorffi</i> . |
| 1900 | <i>Draco rizali</i> | Wandollek | J. Rizal | Dapitan, Mindanao | 1894-96 | |
| 1905 | <i>Lepidodactylus planicaudus</i> | Stejneger | E. A. Mearns | Mt. Apo, Mindanao | 1904 | |
| 1908 | <i>Luposaurus macgregori</i> | do | R. C. McGregor | Calayan | 1903(?) | |
| 1908 | <i>Draco mindanensis</i> | do | E. A. Mearns | Mt. Malindang, Mindanao | 1906 | |
| 1908 | <i>Sphenomorphus atrigularis</i> | do | do | Mindanao | 1906 | |
| 1908 | <i>Tropidophorus misaminius</i> | do | do | do | 1906 | |
| 1908 | <i>Sphenomorphus steerei</i> | do | J. B. Steere | Guimaras | 1905 | |
| 1911 | <i>Tropidophorus partelloi</i> | do | Maj. Partelloi | Mindanao | 1908 | |
| 1915 | <i>Gymnodactylus annulatus</i> | Taylor | E. H. Taylor | Bunawan, Mindanao | 1912-13 | |
| 1915 | <i>Gymnodactylus agusanensis</i> | do | do | do | 1912-13 | |
| 1915 | <i>Hemidactylus luzonensis</i> | do | do | Manila | (?) | |
| 1915 | <i>Lepidodactylus aurilineatus</i> | do | E. H. Taylor | Bunawan, Mindanao | 1912-13 | |

TABLE 1.—*Philippine species of lizards in the chronological order in which the types were described*—Continued.

| Type described. | Species. | Authority. | Collector. | Locality. | Collection date. | Remarks. |
|-----------------|---|------------|---------------|----------------------|------------------|----------------------------------|
| 1915 | <i>Phrynosoma intermedia</i> | Taylor | E. H. Taylor | Bunawan, Mindanao... | 1912-13 | Referred to subspecies. |
| 1915 | <i>Sphenomorphus palustris</i> | do | do | do | 1912-13 | |
| 1915 | <i>Sphenomorphus coxi</i> | do | do | do | 1912-13 | |
| 1915 | <i>Sphenomorphus mindanensis</i> | do | do | do | 1912-13 | |
| 1915 | <i>Sphenomorphus curtirostris</i> | do | do | do | 1912-13 | |
| 1915 | <i>Emoia ruficauda</i> | do | do | do | 1912-13 | In Bureau of Science collection. |
| 1915 | <i>Tropidophorus rivularis</i> | do | do | do | 1912-13 | |
| 1915 | <i>Dibamus argenteus</i> | do | do | Butuan, Mindanao | 1912-13 | |
| 1915 | <i>Luperosaurus compressicarpus</i> | do | Unknown | Unknown | (?) | |
| 1915 | <i>Dasia griffini</i> | do | L. E. Griffin | Taytay, Palawan | (?) | |
| 1917 | <i>Brachymeles elerae</i> | do | Unknown | Unknown | 1915 | In Santo Tomás University. |
| 1917 | <i>Brachymeles burksi</i> | do | E. H. Taylor | Sumagui, Mindoro... | 1916 | |
| 1917 | <i>Lepidodactylus christiani</i> | do | do | Mt. Canlaon, Negros | 1915 | |
| 1917 | <i>Sphenomorphus arborens</i> | do | do | do | 1915 | |
| 1917 | <i>Staphos auriculatum</i> | do | do | do | 1915 | |
| 1917 | <i>Leiodipsa pulchellum grande</i> | do | do | do | 1915 | In Santo Tomás University. |
| 1918 | <i>Lepidodactylus naujanensis</i> | do | do | Lake Naujan, Mindoro | 1916 | |
| 1918 | <i>Sphenomorphus lednickyi</i> | do | V. Lednický | Masbate | 1917 | |
| 1918 | <i>Sphenomorphus lanosi</i> | do | Unknown | Unknown | (?) | |
| 1918 | <i>Staphos kempi</i> | do | E. H. Taylor | Lake Naujan, Mindoro | 1916 | |
| 1918 | <i>Brachymeles suluensis</i> | do | do | Bubuan, Jolo | 1917 | |
| 1918 | <i>Brachymeles vermis</i> | do | do | do | 1917 | |
| 1918 | <i>Sphenomorphus bipartitatus</i> | do | do | Lapac | 1917 | |

| | | | | |
|------|--|----------|--------------------------|------|
| 1918 | <i>Luperosaurus joloensis</i> | do | Jolo | 1917 |
| 1918 | <i>Lepidodactylus divergens</i> | do | Great Govenen, Jolo .. | 1917 |
| 1918 | <i>Hemiphyllodactylus insularis</i> | do | Sumagui, Mindoro | 1916 |
| 1918 | <i>Sphenomorphus jagorii divergens</i> | do | Lake Naujan, Mindoro .. | 1916 |
| 1918 | <i>Sphenomorphus jagorii grandis</i> | do | Canlaon volcano, Negros. | 1915 |

TABLE 2.—Species of Philippine lizards whose types are extra-Philippine, in the chronological order in which they have first been reported as occurring in the Philippines.

| First Philippine record. | Species. | Authority. | Collector. | Locality. | Date of collection. | Remarks. |
|--------------------------|--|---------------|-------------------------|-------------------|---------------------|---|
| 1835 | <i>Varanus salvator</i> Laurenti | Wiegman | Meyen | (?) | (?) | <i>Keneuxia smaragdina</i> Gray. |
| 1845 | <i>Dasia smaragdinum</i> Lesson | Gray | Unknown | Philippines | (?) | <i>Tiliqua grisea</i> Gray. Type. |
| 1845 | <i>Dasia olivaceum</i> Gray | do | H. Cuming | do | 1836-40 | <i>Mocoo cumingii</i> Gray. Type. |
| 1845 | <i>Emoia atrocostatum</i> Lesson | do | do | do | 1836-40 | <i>Gekko verus</i> Gray. |
| 1845 | <i>Gekko gekko</i> Linnaeus | do | do | do | 1836-40 | Nomenclator Rept. et Amph. |
| 1856 | <i>Mabuya multifasciata</i> Kuhl | do | do | do | do | Mus. Zool. Berlin 1856-p38. |
| 1858 | <i>Emoia cyanurum</i> Lesson | Girard | Wilkes Expedition | Philippines | do | <i>Emoa cyanura</i> Girard. |
| 1868 | <i>Hemidactylus frenatus</i> Duméril and Bibron. | Cope | (?) | Manila | (?) | <i>Hemidactylus longiceps</i> Cope. Type. |

TABLE 2.—Species of Philippine lizards whose types are extra-Philippine, in the chronological order in which they have first been reported as occurring in the Philippines—Continued.

| First Philippine record. | Species. | Authority. | Collector. | Locality. | Date of collection. | Remarks. |
|--------------------------|--|-----------------------|-----------------|--------------|---------------------|--|
| 1869 | <i>Cosymbotes platyurus</i> Schneider. | Steindachner. | (?) | Manila | (?) | <i>Cosymbotes platyurus</i> Steindachner. |
| 1879 | <i>Gekko monarchus</i> Duméril and Bibron. | Günther. | A. Meyer. | Dinagat | 1870-73 | <i>Gekko monarchus</i> Günther. |
| 1885 | <i>Calotes cristatellus</i> Kuhl. | Boulenger. | A. Everett. | Palawan. | | |
| 1885 | <i>Hemidactylus garnotii</i> Duméril and Bibron. | do. | ? H. Cuming. | Philippines. | ?1886-40 | |
| 1886 | <i>Hemiphyllodactylus typus</i> Bleeker. | Parenti and Picaglia. | (?) | Ticao | (?) | <i>Spathodactylus mutilatus</i> Günther. |
| 1890 | <i>Draco volans</i> Linnæus. | Mocquard. | J. Whitehead. | Palawan. | 1885 | |
| 1895 | <i>Lygosoma chalcides</i> Linnæus. | Boettger. | A. Schadenberg. | Busuanga | (?) | <i>Lygosoma (Lygosoma) chalcides</i> Boettger. |
| 1910 | <i>Draco cornutus</i> Günther. | Werner. | (?) | Jolo | (?) | |
| 1918 | <i>Staphos infralineolatus</i> Günther. | Taylor. | E. H. Taylor. | Sulu | 1917 | Also collected in Mindanao in 1912. |
| 1918 | <i>Lepidodactylus woodfordi</i> Boulenger. | do. | do. | Bubuan, Sulu | 1917 | |
| 1918 | <i>Mabuya rudis</i> Boulenger. | do. | do. | Bitinan | 1917 | |
| 1918 | <i>Riopa bowringii</i> Günther. | do. | do. | Jolo | 1917 | |

DISTRIBUTION OF PHILIPPINE LIZARDS

Five saurian families, Gekkonidæ, Agamidæ, Varanidæ, Scincidæ, and Dibamidæ, are represented in the Philippine Islands. These five families and no others are also found in Celebes and the Moluccas. New Guinea has representatives of five; also an endemic family, the Pygopodidæ.

Borneo has representatives of the five families found in the Philippines and of three others; namely Helodermatidæ, represented by the extremely rare *Lanthonotus borneensis*; Lacertidæ, represented by a single widespread species, *Takydromus sexlineatus*; and the Anguidæ, also represented by a single species, *Ophisaurus buttikoferi*, known from a single specimen. I have suggested that representatives of the last three families may be found in Palawan, since the reptilian fauna of that island shows a more-marked affinity to that of Borneo than to that of other Philippine island groups.

The representative of the Lacertidæ might be regarded as a recent immigrant to this eastern locality since the species is known on the land masses intervening between this locality and the Afro-Asian regions in which the family appears to have originated. The representatives of the two latter families are obviously rem-

TABLE 3.—Distribution of saurian families.

| Family. | Polynesia. | New Zealand. | Australia. | New Guinea. | Celebes. | Philippines. | Palawan. | Borneo. | Java. | Sumatra. | Malay Peninsula. | Japan. | Asia. | Africa. | Madagascar. | Europe. | North America. | Central America. | South America. |
|--------------------|------------|--------------|------------|-------------|----------|--------------|----------|---------|-------|----------|------------------|--------|-------|---------|-------------|---------|----------------|------------------|----------------|
| Gekkonidæ..... | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Eublepharidæ..... | | | | | | | | | | | | | x | x | | | x | x | x |
| Uroplatidæ..... | | | | | | | | | | | | | | | x | | | | |
| Pygopodidæ..... | | | x | x | | | | | | | | | | | | | | | |
| Agamidæ..... | x | | x | x | x | x | x | x | x | x | x | x | x | x | | x | | | |
| Iguanidæ..... | x | | | | | | | | | | | | | | | | x | x | x |
| Zonuridæ..... | | | | | | | | | | | | | x | x | | | | | |
| Anguidæ..... | | | | | | | | x | | | | x | x | | | x | x | x | x |
| Helodermatidæ..... | | | | | | | | x | | | | | | | | | x | | |
| Varanidæ..... | x | | x | x | x | x | x | x | x | x | x | | x | x | | | | | |
| Amphisbænidæ..... | | | | | | | | | | | | x | x | | | | | | |
| Lacertidæ..... | | | | | | | | x | x | x | x | x | x | | | x | | | |
| Gerrhosauridæ..... | | | | | | | | | | | | | | x | x | | | | |
| Anelytroidæ..... | | | | | | | | | | | | | | x | | | x | | |
| Scincidæ..... | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Dibamidæ..... | | | | x | x | x | | x | | x | x | | | | | | | | |
| Xenosauridæ..... | | | | | | | | | | | | | | | | | x | x | |
| Aniellidæ..... | | | | | | | | | | | | | | | | | x | | |
| Xantusiidæ..... | | | | | | | | | | | | | | | | | x | x | |
| Teiidæ..... | | | | | | | | | | | | | | | | | x | x | x |

[illegible]

nants of much older faunas, and not recent arrivals. The nearest relative of *Lanthonotus* is found in southern North America. No other representative has been discovered in the Old World. The Anguidæ have their largest number of representatives in Central America and the West Indies, with species in both North and South America. Two genera occur in Europe, each represented by one species, and one genus with one species in Asia. This is *Ophisaurus gracilis* of India, which is the locality nearest to Borneo where a representative of this family occurs. *Ophisaurus* is a very widespread genus, having only a few species, but these occur on four different continents.

There are twenty-eight recognized genera in the Philippine Islands, about thirty in Borneo, and about twenty-five in the Celebes-Moluccas group. Twenty-one genera are common to Borneo and the Philippines, and all but two of these are also found in the Celebes-Moluccas group; the exceptions are *Hemiphyllodactylus* (which very probably also occurs in the latter islands) and *Ptychozoon*. There are three endemic genera in the Philippines; these are *Brachymeles*, *Luperosaurus*, and *Pseudogekko*. *Lanthonotus* is the only known endemic genus in Borneo. The Philippines have three genera in common with the Celebes-Moluccas group which are as yet unknown in Borneo; these are *Lygosoma*, *Otosaurus*, and *Hydrosaurus*. One genus, *Perochirus*, is known only in Mindanao and in the Caroline Islands.

Of the nine Bornean genera not found in the Philippines, *Takydromus*, *Ophisaurus*, *Japalura*, and *Aphaniotis* are common to Borneo, to the islands lying south and west, and to Asia; *Homolepida* is common to Borneo, Celebes, Java, and Sumatra. *Gonotodes* and *Aleuroscalabotes* have representatives in Australia and the Malay Peninsula, but they are apparently absent from Celebes, Java, and Sumatra; *Mimetozone* is common to Borneo and the Malay Peninsula; and *Lanthonotus*, as remarked above, is endemic.

Of the three Celebes-Moluccas genera not known in the Philippines *Cryptoblepharis* is widely distributed over Polynesia, Australia, Africa, Asia, and Japan, but appears to be wanting in Borneo, the Philippines, and even in Celebes proper; *Homolepida* occurs in Borneo; and *Tiliqua* has representatives in Australia and New Guinea.

Brachymeles is the most important and most distinctive of the three endemic Philippine genera; it is represented by eight species and exhibits a great diversity of size and development or degeneration of limb. No species is known to occur in

Palawan, but the genus appears to be represented with equal frequency elsewhere in the Islands. No closely related genus is known in any adjacent territory. The absence of this genus from northern Borneo (if it is indeed absent) would suggest that it is of comparatively recent development. There are no less than three species of the genus in the Sulu region, which lies nearest Borneo. If our theories of the migration of species merits serious consideration, some of these species should certainly have reached the northern Borneo coast while the transfer of species represented by the twenty-one common genera mentioned above was being made, unless they are indeed a later development. This theory, however, is hardly substantiated by the wide distribution in the Philippines.

Luperosaurus has three known species; one on Calayan, Babuyan Islands, in the extreme northern part of the group, and a second on Jolo Island, in the extreme southern part of the Archipelago. The exact type locality of the third is unknown. All of these species are known by only the types and cotypes. Owing to the apparent rarity of the lizards of this genus they may have easily remained undiscovered in Borneo and neighboring islands.

Pseudogekko appears to have its nearest relative in the genus *Thecadactylus*, which occurs in New Guinea and certain adjacent islands. It is extremely rare, only three specimens, of the single known species, being known.

CLASSIFICATION OF THE LIZARDS

Several systems for the classification of the lizards have been offered by various authors in recent years. They vary materially, chiefly in the relative importance of the higher groups. Boulenger's Catalogue,* since its publication, in 1885-1887, has been the standard work on this group of animals; just as the *Erpétologie Générale*, of Duméril and Bibron, had been prior to that time. Boulenger's system of classification of the living forms is as follows:

Order. Squamata.†

Suborder I. Ophidia (snakes).

(Numerous families.)

* Boulenger, G. A., Catalogue of the Lizards in the British Museum (Natural History) 1 (1885), 2 (1886), 3 (1887).

† See also Boulenger, Fauna Brit. India (1890) 52; and Ann. & Mag. Nat. Hist. V 14 (1884) 120.

Suborder II. Lacertilia.

- Family 1. Geckonidæ.
 2. Eublepharidæ.
 3. Uroplatidæ.
 4. Pygopodidæ.
 5. Agamidæ.
 6. Iguanidæ.
 7. Xenosauridæ.
 8. Zonuridæ.
 9. Anguidæ.
 10. Aniellidæ.
 11. Helodermatidæ.
 12. Varanidæ.
 13. Xantusiidæ.
 14. Teiidæ.
 15. Amphisbænidæ.
 16. Lacertidæ.
 17. Gerrhosauridæ.
 18. Scincidæ.
 19. Anelytropidæ.
 20. Dibamidæ.

Suborder III. Rhiptoglossi.

- Family 21. Chamæleontidæ.

Cope * has followed a system that varies considerably from that accepted by Boulenger. He relegates the Rhiptoglossa to a place under the Sauria as a superfamily and makes use of other superfamilies. His system follows:

Order Squamata.

1. Suborder Ophidia.
 2. Suborder Sauria.
 1. Superfamily Rhiptoglossa.
 1. Family Chamæleonidæ.
 2. Superfamily Nyctisauria.
 2. Family Eublepharidæ.
 3. Family Geckonidæ.
 3. Superfamily Pachyglossa.
 4. Family Agamidæ.
 5. Family Iguanidæ.
 4. Superfamily Uroplatoidea.
 6. Family Uroplatidæ.
 5. Superfamily Thecoglossa.
 7. Family Varanidæ.
 6. Superfamily Helodermatoidea.
 8. Family Helodermatidæ.

* Cope, E. D., in An. Rep. Smithsonian Institution (1898); see also Cope, Proc. Acad. Nat. Sci. Philadelphia (1861) 224 and Proc. Am. Assoc. Adv. Sci. 19 (1871) 236.

Order Squamata—Continued.

Suborder Sauria—Continued.

7. Superfamily Diploglossa.

9. Family Zonuridæ.

10. Family Pygopodidæ.

11. Family Anguidæ.

12. Family Xenosauridæ.

8. Superfamily Leptoglossa.

13. Family Xantusidæ

14. Family Teiidæ.

15. Family Lacertidæ.

16. Family Gerrhosauridæ.

17. Family Scincidæ.

18. Family Acontiidæ.

19. Family Dibamidæ.

20. Family Anelytropidæ.

9. Superfamily Annulati.

21. Family Trogonophidæ.

22. Family Amphisbænidæ.

23. Family Euchirotidæ.

10. Superfamily Annielloidea.

24. Family Anniellidæ.

Stejneger, in his work on Japanese reptiles, appears to have agreed with Boulenger in regard to the status of the *Rhaptoglossi* as a suborder. Stejneger's accepted names for the two other suborders are Sauria and Serpentes, instead of Lacertilia and Ophidia of Boulenger, both of which are older names and synonymous with those used by Boulenger. No matter which of these systems is followed, the position and the terminology of the various families found in the Philippines remain unchanged, as they are identical in all. Stejneger's arrangement of the higher groups is here followed.

Order SQUAMATA

The order Squamata is divided into three suborders as follows:

1. Rhiptoglossi, the true chameleons.
2. Sauria, the lizards.
3. Serpentes, the snakes.

No member of the first suborder is found in the Philippines.

Suborder SAURIA

The living Sauria are divided into numerous families, the actual number varying with different authors. In the Philippines five well-defined families are represented. They are characterized as follows:

Family I. GEKKONIDÆ.—Tongue smooth or with villose papillæ; no postorbital or postfrontosquamosal arches; clavicle dilated proximally; vertebræ amphicælian; parietal bones distinct.

Family II. AGAMIDÆ.—Tongue smooth or with villose papillæ; clavicle not dilated proximally; postorbital and postfrontosquamosal arches present; supratemporal fossa not roofed over by bone; tongue thick; dentition acrodont.

Family III. VARANIDÆ.—Tongue elongate, forked at end, sheathed posteriorly; postorbital arch incomplete; postfrontosquamosal arch present; supratemporal fossa not roofed over; nasal bone single.

Family IV. SCINCIDÆ.—Tongue covered with imbricate scalelike papillæ; dentition pleurodont; arches present; premaxillary double; body with osteodermal plates.

Family V. DIBAMIDÆ.—Tongue covered with curved lamellæ or plicæ; no interorbital septum; no arches; no osteodermal plates.

GEKKONIDÆ

Gekkonidæ STEJNEGER, Bull. U. S. Nat. Mus. 58 (1907) 164.

Eleven genera of geckos are known from the Philippines. Many of the species are domestic and are carried from place to place through the agency of man. The species that are generally found in human habitations are *Hemidactylus frenatus*, *H. luzonensis*, *H. garnotii*, *Peropus mutilatus*, *Cosymbotus platyurus*, *Gekko gecko*, and *G. monarchus*. The first five are the smaller species, and are known variously as *taló-tó* (Leyte Visayan), *alo-tí-it* (Ilocano), *butikí* (Tagalog), *sucsuc* (Manobo),

and *pirrit* (Moro); the larger ones are known as *chacon* (Spanish-Tagalog) *ti-kí* (Leyte Visayan), *ti-ká* (Ilocano) and *tok-ko* (Tagalog).

The call of the smaller species is a series of quickly repeated clicks or chirps. When fighting they utter a long growling note in a much lower pitch, which can be heard at a distance of several meters. The call of *Gekko gekko* is preceded by several short, rapid, guttural notes. The call is "tok-kó," repeated slowly, seven or eight times, the ultimate note somewhat prolonged.

The tails of the geckos are very fragile. When one is broken off, a cartilaginous process is developed from the centrum of the last remaining vertebra, and muscles, skin, and scales appear on this process. Regeneration continues until the tail regains nearly its normal length. The new tail readily breaks, and a new growth takes place. Specimens showing three or four separate growths are not uncommon. Occasionally a double or bifid tail is produced.

In the normal tail of many species the various vertebræ of the tail are indicated by annulations due to the arrangement of the scales. In the regenerated tail these annulations are usually wanting, and the character of the scales is different.

Most of the geckos are lowland species. None was found by me in the vicinity of Baguio, which has an elevation of about 1,400 meters; and *Lepidodactylus planicaudus* Stejneger from less than 2,000 meters on Mount Apo, Mindanao, has the highest range of any Philippine gecko.

Key to the Philippine genera of the Gekkonidæ.

- a*¹. Digits slightly dilated at base, two or three distal joints narrow, compressed, and angularly bent; all digits clawed; claw between two scales, a small superior and a large lateroinferior.

Gymnodactylus Spix (p. 43).

- a*². Digits dilated; a single distal phalanx long and compressed.

- b*¹. The free distal joint long, rising from within the extremity of the distal expansion; digits with transverse lamellæ below, either in double or single rows.

- c*¹. Infradigital plates in a double series.

- d*¹. Inner digit with a compressed clawed phalanx; dorsal scales granular or with tubercles intermixed; no lateral flaplike expansion of skin..... *Hemidactylus* Oken (p. 52).

- d*². Inner digit with clawed distal phalanx; a lateral flaplike expansion of skin; scales granular; no tubercles.

Cosymbotus Fitzinger (p. 59).

- c*². Infradigital plates divided by a median line; inner digits without distal phalanx or claw; digits strongly dilated.

Peropus Wiegmann (p. 62).

- c³. Infradigital plates in a single series; inner digit rudimentary, clawless on foreleg, clawed on hind leg.
 Perochirus Boulenger (p. 65).
- b³. The free distal joint rises from the extreme tip of the digital expansion.
- c¹. A single series of infradigital lamellæ.
- d¹. Digits narrowed at base, distal joint long and slender; inner digit very rudimentary..... Hemiphyllodactylus Bleeker (p. 65).
- d². Digits slightly narrowed at base; distal joint short; inner digits well developed, clawless..... Lepidodactylus Fitzinger (p. 70).
- c². A single series of infradigital lamellæ.
- d¹. Digits half webbed, inner clawless.. Luperosaurus Gray (p. 85).
- d². Digits free or slightly webbed, inner clawless.
 Gekko Laurenti (p. 90).
- d³. Digits entirely webbed, inner clawless.
 Ptychozoon Kuhl (p. 100).
- a³. Digits dilated, entire length with a single series of lamellæ divided at tip only; claw sessile and retractile; body narrowed; digits slightly webbed..... Pseudogekko g. nov. (p. 103).

Genus GYMNODACTYLUS Spix

Gymnodactylus SPIX, Spec. Nov. Lacert. Bras. (1825) 17.

Digits strong, clawed, cylindrical or depressed on the base and strongly compressed, the remaining portion usually with a strong angular kink; claw between two enlarged scales; digits more or less enlarged with transverse plates below; body usually covered with granules and tubercles intermixed; males and females * with or without preanal or femoral pores.

Distributed over the borders of the Mediterranean Sea, southern Asia, Malay Archipelago, Australia, Pacific Islands, and tropical America.

The species of this genus differ greatly from the other Philippine Gekkonidæ, in the absence of broadened lamellæ under the toes, which enable the other species to move rapidly over smooth, perpendicular surfaces, or even to run in an inverted position over a smooth ceiling. In consequence lizards of this species are only rarely found in houses. One group of the species of *Gymnodactylus* is terrestrial, a large number living in desert regions where they are known as sand or rock geckos. The other group of the species is largely arboreal.

The Philippine species are usually found under logs or rocks or under loosened bark of forest trees a short distance from the ground. Not infrequently a gecko when surprised by the overturning of a log remains quite motionless, and due to its strongly

* Only recorded in *Gymnodactylus agusanensis* Taylor and *G. fumosus* Müller.

length of snout; distance of eye to auricular opening slightly less than distance of eye to nostril; height of head in occipital region equal to length of snout; rostral subquadrangular, with a suture entering above, bifurcating a little above the middle of the scale; nostril bounded by three or four postnasals, the first labial usually, the rostral, and a supranasal; latter rather large, in contact with rostral, separated from its fellow by one or two small internasals; twelve to fourteen upper labials with a row of rather enlarged keeled scales above; ten to thirteen lower labials; mental large, triangular, with a pair of much enlarged chin shields bordering it behind; these are also in contact with each other and with first labial, but separated from second labial by an enlarged scale; second pair of chin shields frequently present, of variable size, usually small, in contact with each other

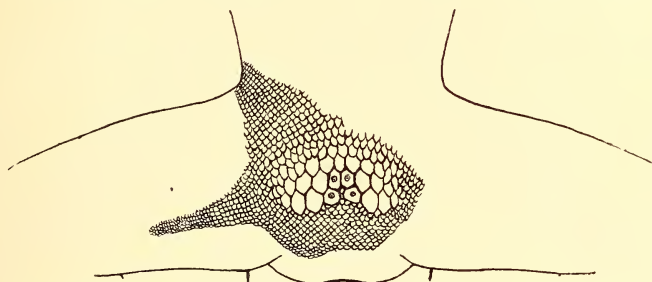


FIG. 1. *Gymnodactylus annulatus* Taylor, from Sulu; preanal pores, variation; $\times 3$.

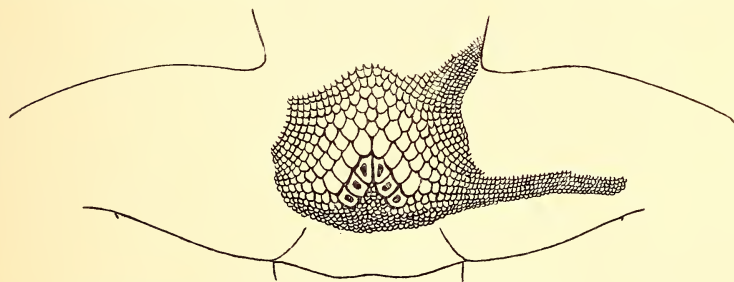


FIG. 2. *Gymnodactylus annulatus* Taylor, from Mindanao; preanal pores, typical; $\times 3$.

and with first pair; snout covered with granules slightly larger than those on occiput or body; body covered with minute granules intermixed with large, round, trihedral tubercles in fourteen to sixteen irregular longitudinal rows; tail covered above with small uniform granules arranged in transverse rows; at the base a few transverse rows of tubercles marking annulations; granules on neck small, increasing a little in size toward labials; belly with cycloid, imbricating scales, fifty to sixty between the lateral skin folds, which run from axilla to groin; tail below with

somewhat larger scales in irregular transverse rows; males with a narrow angular series of four to six (very rarely seven) pre-anal pores inclosing a distinct groove bordered by two or three rows of enlarged scales rapidly diminishing in size; scales immediately in front of anus small; females with a distinctly differentiated series of six preanal scales bordered with larger scales; no femoral pores; lateral skin fold without, or with only very small, tubercles; digits moderately compressed, the plates under digits well differentiated at base, about eighteen to twenty under longest toe.

Color in life.—Body rather light brown to black-brown above, with four or five broad, irregular, darker brown spots or bands, usually with darker edges; tail marked with darker and lighter annulations; yellow to light brown or grayish below; tubercles above usually lighter; head reticulated with darker brown.

Measurements of Gymnodactylus annulatus Taylor. No. 564 E. H. T. collection.

| | mm. |
|-----------------|------|
| Total length | 131 |
| Snout to vent | 60 |
| Tail | 71 |
| Width of head | 12.5 |
| Length of head | 18 |
| Foreleg | 19 |
| Hind leg | 28 |
| Axilla to groin | 25 |

Remarks.—The largest specimen taken is only 141 millimeters long. Obviously this species is much smaller than the other known Philippine species. This form is most closely related to *G. consobrinus* Peters. The following differences are evident: In the latter there is a larger number of preanal pores, not arranged in a pubic groove; the eye is apparently larger; there are enlarged tubercles on the lateral skin fold, and there is a greater number of rows of scales across the belly.

The type was collected in July, 1913, by myself. The first specimens, however, were collected nearly a year earlier in the same locality. In 1917 I collected the species on the following Sulu islands: Great Santa Cruz, Basilan, Teipono, Tamuk, Cancuman, Bubuan (Tapiantana group), Dipolod, Bitinan, Jolo, Tulian, Bubuan (Tapiian group), Tawitawi, Papahag, and Bongao. It is one of the commonest species in the Sulu Archipelago.

It was noted that specimens from the various islands showed slight differences, especially in the arrangement and size of the preanal pores and the scales surrounding them. Specimens from Sulu have an average of only four preanal pores.

GYMNODACTYLUS PHILIPPINICUS Steindachner

Cyrtodactylus marmoratus GRAY, Cat. Liz. (1845) 173, part.

Gymnodactylus philippinicus STEINDACHNER, Novara Exp., Rept. Wien (1869) 17, pl. 2, fig. 1; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 46; BOETTGER, Ber. Senck. Nat. Ges. (1886) 94; DE ROOIJ, Indo-Aust. Arch. 1 (1915) 17; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 367.

Description of species.—(From a series of specimens from Negros, Mindoro, and Polillo.) Head rather large, not especially depressed, much longer than wide, depth of head in occipital region equal to length of snout; eye large, its distance

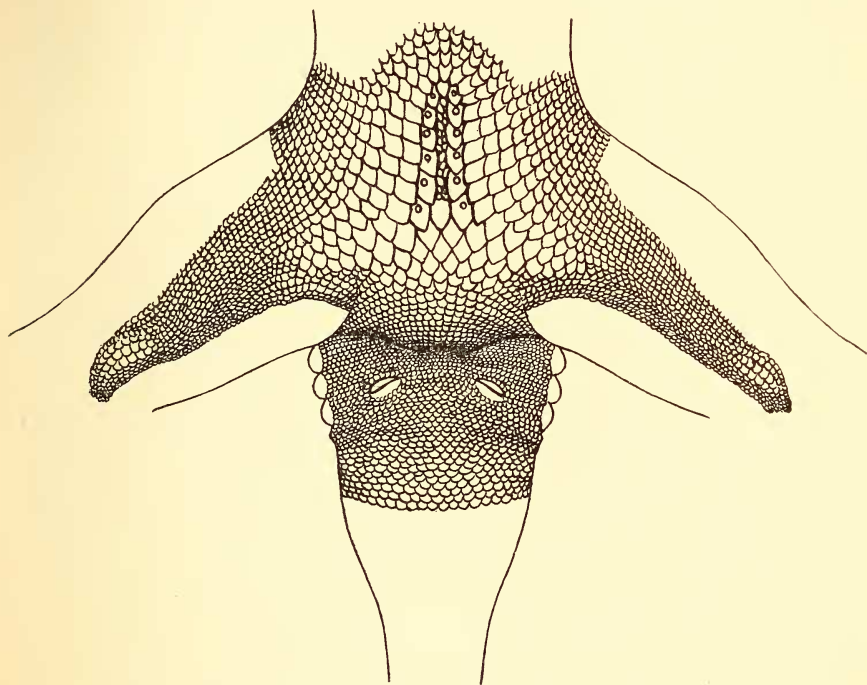


FIG. 3. *Gymnodactylus philippinicus* Steindachner, preanal pores; $\times 3$.

from nostril equal to or a little greater than its distance from auricular opening; rostral large, subrectangular, somewhat rugose, partially divided by a cleft from above, which forks near the middle of the scale; nostril surrounded by rostral (which enters it broadly), first labial (usually), two or three postnasals, and enlarged supranasal; latter broadly in contact with rostral but separated from its fellow by two or three scales; ten to twelve upper labials, eleven lower labials; mental large, regularly triangular, followed by a pair of chin shields broadly in contact with first labial and with each other; a slightly enlarged

scale separating them from second labial; usually a second pair of small chin shields, in contact with first pair and with each other; granules on throat small, increasing slightly in size toward labials; region behind nostrils depressed, forming a "nose;" snout depressed above, the granules here larger than those on occiput or body; body covered above with minute granules intermixed with about twenty rows of enlarged (sometimes keeled) tubercles; tail with rows of tubercles marking caudal annulations; belly covered with small, cycloid, imbricating scales; abdominal region limited by a fold of skin with an almost continuous series of slightly enlarged scales, sometimes with enlarged scattered tubercles; about sixty rows of abdominal scales across belly; males with preanal pores in two parallel series in a deep longitudinal groove, bordered by three rows of enlarged scales, of which the outer are smaller; a small group of slightly enlarged scales in outer femoral region; three or four strongly enlarged tubercles at base of tail; females with a series of similarly enlarged preanal scales without pores, sometimes with a slight groove filled in with minute granules; legs long, hind leg reaching axilla or beyond; digits strong, somewhat depressed at base, remaining portion strongly compressed; transverse plates under toe not or but slightly differentiated in basal portion.

Color in life.—Above yellowish brown traversed with several brown, irregular, darker-edged bands; a distinct brownish line from snout through eye which usually joins its fellow on occiput; labials spotted with yellow; belly yellowish, yellowish brown, or blackish gray; tubercles above usually light, sometimes yellowish.

Measurements of Gymnodactylus philippinicus Steindachner. Male from Mindoro, female from Negros.

| | Male. mm. | Female. mm. |
|-----------------------------|--------------|----------------|
| Snout to vent, tail missing | 83 | 86 |
| Width of head | 16 | 16 |
| Length of head | 24 | 25.5 |
| Foreleg | 32 | 32 |
| Hind leg | 42 | 43 |
| Axilla to groin | 36 | 39 |

Variation.—The largest specimen examined was taken from the stomach of a snake, *Boiga dendrophila*, from Polillo; the tail is missing as is also most of the flesh from the head. The measurements are: Snout to vent, 94 millimeters; foreleg, 35; hind leg, 45. Negros specimens are lighter in color; specimens

taken in Mindoro are very much darker above and below; one young specimen, locality unknown but said to be Dumaran Island, near Palawan, is almost black with deep black bands; the belly also is black. This locality is doubtful.

Remarks.—This species is distinctly larger than *G. annulatus* Taylor and differs also in the arrangement of the preanal pores; in color and markings they are quite similar. Individuals are most frequently encountered under the loose bark of trees near the ground. They take fright easily, apparently not relying much on protective coloration to escape observation. In Mindoro the species was common about Lake Naujan; in the mountains of Negros it was rare. It is known from Luzon, Mindoro, Polillo, Dinagat, and Samar and probably is confined to the Philippines.*

GYMNODACTYLUS AGUSANENSIS Taylor

PLATE 1, FIG. 2

Gymnodactylus agusanensis TAYLOR, Philip. Journ. Sci. § D 10 (1915) 90.

Description of species.—(From a series of specimens, including the type from Bunawan, Agusan, Mindanao.) Head large, oviform, with a depressed area above delineating supraorbital regions and continuing some distance on snout; depressed areas behind nostrils giving the appearance of a "nose;" eye very large, its diameter only slightly less than its distance from nostril, which equals distance of eye to auricular opening; depth of head in occipital region equals length of snout; auricular opening

* Boettger, Abh. Senckenb. Ges. 20 (1900) 332, lists *Gymnodactylus philippinicus* Steindachner from Halmahera. De Rooij, Rept. Indo-Aust. Arch. 1 (1915) 17, says: "At a closer examination of a specimen preserved in the British Museum and four specimens of the Senckenberg Museum in Frankfurt, named by Boettger *G. philippinicus*, I came to the conclusion, that they did not belong to that species, but were most probably *G. fumosus*, slightly different from the typical Celebes-specimens. The dorsal tubercles are somewhat larger and more numerous; the ear-opening is oval, oblique. That they could not belong to *G. philippinicus*, was evident at first sight, because the last-named species has a pubic groove with two parallel series of six preanal pores, and the subdigital transverse plates scarcely differ from the surrounding scales."

It is doubtful whether de Rooij has bettered matters by referring these specimens to *G. fumosus* Müller, since that species, according to the same author, has "a pubic groove and a continuous series of 42-52 pores, pierced in enlarged scales, which are visible in the female." Boettger specifically states that his specimens have seven to thirteen preanal pores in an angular inverted V-shaped row. It may in fact be related more closely to *G. annulatus* Taylor, but this I cannot affirm.

obliquely oval to triangular, greatest diameter equal to one-third the diameter of eye; rostral large, much wider than high, subrectangular, broadly entering nostril, deeply notched above, almost surrounding an "interrostral" scale, which is usually present but of varying size; bounded behind by two supranasals; latter separated by one or two internasals; nostril bounded by rostral, first labial, two postnasals, and a supranasal; ten to twelve upper labials, rather roughened with a row of keeled scales immediately above; eleven lower labials; mental triangular, large; a pair of large chin shields bordering mental, much longer than wide, in

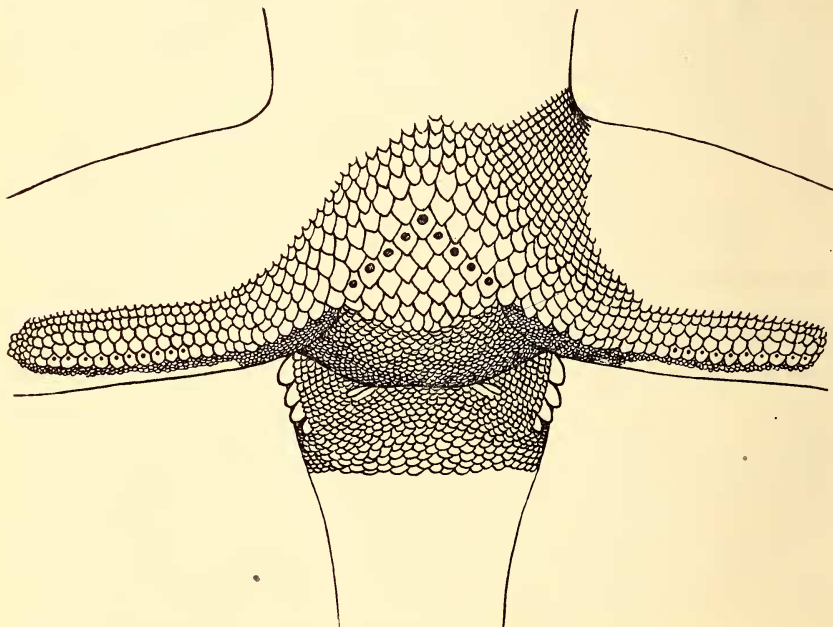


FIG. 4. *Gymnodactylus agusanensis* Taylor, femoral and preanal pores; $\times 3$.

contact with first labial, and a somewhat enlarged scale on the side, sometimes two or three other enlarged scales following; scales on snout, especially those in front of eye, largest; scales on chin and throat small, granular, growing larger toward labials; body above with minute granules intermingled with eighteen to twenty irregular rows of enlarged, conical, or trihedral tubercles of varying sizes; those on tail arranged in transverse rows, marking annulations, but disappearing about halfway back on tail; three or four enlarged tubercles on each side of base of tail; abdomen limited by a skin fold on which is a row of tubercles; ventral scales larger, imbricate, in forty-six to

fifty longitudinal rows; preanal region with a large area of much-enlarged scales with two or three rows of enlarged femoral scales; males and females with preanal and femoral pores; preanal pores in a broadly angular series, eight to eleven altogether; femoral pores widely separated from the former, eight to eleven on each side; those in females much smaller but visible; digits depressed basally and compressed, the remaining part each with a well-defined crook; subdigital lamellæ well defined, twenty-five to twenty-seven under longest toe; tail rather cylindrical, tapering, no transverse plates below.

Color in life.—Grayish above with broad, irregular, dark brown crossbands; tail above annulated with broad, dark brown to black rings, separated by narrow, cream-white to grayish brown bands; a broad brown band from snout through eye to occiput; a lighter line above and below this; upper light line usually curving and meeting its fellow on occiput; labials darker, spotted with yellowish; younger specimens much darker than older specimens, with markings more strongly contrasted.

*Measurements of Gymnodactylus agusanensis Taylor. No. 639,
E. H. Taylor collection.*

| | mm. |
|----------------|-----|
| Total length | 220 |
| Snout to vent | 106 |
| Width of head | 23 |
| Length of head | 29 |
| Foreleg | 40 |
| Hind leg | 55 |

Remarks.—This species is related to *Gymnodactylus marmoratus* but is much larger. The presence of pores in the female and the arrangement of the preanal pores in a broadly angular series (not inclosing a longitudinal groove), together with a number of less-obvious differences, clearly differentiate it from *G. marmoratus*. From *G. mimikanus*, another related species, it differs in having small scales below the tail instead of transverse plates; the color and markings are essentially different. The arrangement of the preanal and femoral pores is, however, similar.

Known only from the type locality, where it was rare. A colony was found in a pile of rotting logs. One specimen was found in a hole in a tree 2 meters from the ground. When first taken the colors were much more strongly contrasted than later when exposed to light.

Genus **HEMIDACTYLUS** Oken*Hemidactylus* OKEN Isis (1817) 1183.

Compressed distal phalanx of digits free, rising angularly from within the edge of the dilated portion; subdigital lamellæ in two series; inner digit with compressed clawed phalanx; underside of tail with a median series of large, transversely dilated plates.

The genus is cosmopolitan and is represented in nearly all the warmer parts of the world.

Key to the Philippine species of Hemidactylus Oken.

*a*¹. Digits without trace of web; distal joints long.

*b*¹. Femoral pores, 30 to 36; a few, flat, rounded, dorsal tubercles; spiny tubercles on tail; inner digit very short, with sessile claw; a slight trace of skin fold from axilla to groin.

H. frenatus Duméril and Bibron (p. 52).

*b*². Short series of femoral pores widely separated, 5 or 6 on each side; a lateral skin fold from axilla to groin; 16 irregular rows of strongly keeled tubercles on back; spiny rows of tubercles on tail.....*H. luzonensis* Taylor (p. 55).

*a*². Digits partly webbed; tail flattened, with a denticulate fringe; males with 16 to 18 pores, forming a continuous series.

H. garnotii Duméril and Bibron (p. 56).

The species of this genus are largely domestic. In the Philippines *Hemidactylus frenatus* is very common and is found everywhere, entering houses and other buildings and even ships. Lizards of this species are also found under the bark of trees in the forests, about rocks, and even in fields where there is no other vegetation than cogon grass. The other Philippine species are as yet little known and are apparently rare in the Islands. I have examined several specimens of *H. luzonensis*, three of which were taken from the walls of the Malate Church, Manila, and one from the eastern coast of Lake Bay. Nothing further than this is known of its distribution. *Hemidactylus garnotii* usually has the same habitat as *H. frenatus*. The two specimens of *H. garnotii* that I collected in Mindoro were taken on a large buri palm, at a considerable distance from human habitation. A third specimen examined is in the collection of W. Schultze, Manila, and was taken at Montalban, Luzon.

HEMIDACTYLUS FRENATUS Duméril and Bibron

Hemidactylus frenatus DUMÉRIL and BIBRON, *Erp. Gén.* 3 (1836) 336; KELAART, *Prodr. Faun. Zeyl.* (1852) 161; GÜNTHER, *Rept. Brit. India* (1864) 108; STEINDACHNER, *Novara Exped., Rept.* (1869) 12; STOLICZKA, *Journ. As. Soc. Bengal* 39 (1870) 164, 41 (1872) 96;

ANDERSON, Zool. W. Yunnan (1879) 801; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 120; PARENTI and PICAGLIA, Atti. Soc. Nat. Modena, Mem. Orig. III 5 (1886) 13; STEJNEGER, Bull. U. S. Nat. Mus. 58 (1907) 172.

Hemidactylus inornatus HALLOWELL, Proc. Acad. Nat. Sci. Philadelphia (1860) 492.

Gecko chaus TYTLER, Journ. As. Soc. Bengal 33 (1864) 547.

Hemidactylus vittatus GRAY, Zool. Erebus and Terror, pl. 15, fig. 5.

Hemidactylus longiceps COPE, Proc. Acad. Nat. Sci. Philadelphia (1868) 320.

Description of species.—(From No. 1110, E. H. Taylor collection; collected at Butuan, Agusan, Mindanao, 1912, by E. H. Taylor.) Rostral quadrangular, broader than high, bordering nostril, upper part with a broad groove, and a short median cleft entering from upper part; nostril bordered above by a supranasal, behind by three postnasals, below by first labial, in front by rostral; supranasals separated by a single median scale; snout with a distinct longitudinal depression in front and between eyes, terminating posterior to nostrils; eleven upper labials, the last not posterior to posterior vertical of eye; scales on snout large, those above labials largest; nine lower labials; mental very large, followed by two pairs of enlarged chin shields, first pair touching only first labial and forming a long suture behind mental; second pair smaller, touching first and second labials, separated by three small scales; several somewhat enlarged scales posterior to these shields and bordering lower labials; granules on chin and throat small, uniform, except just below angle of jaw, where they are nearly twice as large as the others; granules on occiput much smaller than those on back; latter fairly uniform in size, slightly larger laterally; two medial rows of rounded, enlarged, flat tubercles; two or three rows of enlarged tubercles dorsolaterally, not arranged regularly; scales on upper aspect of legs much larger than body granules; below, scales rounding, enlarged, imbricate, arranged in twenty-six to twenty-eight longitudinal rows; a continuous curved row of thirty-one preanal and femoral pores, not angular medially; tail rather flattened at base, tapering, rather cylindrical toward tip, covered above with granules larger than those on body, the latter arranged in transverse rows; annulations marked above by transverse rows of six enlarged, more or less spiny tubercles, below with a series of enlarged transverse plates; digits moderately dilated, entirely free, the inner with a sessile claw, and with four lamellæ below, those at tip and base single; fourth toe with nine lamellæ, single at tip, continuing divided to base of digit; ear opening moderate, roundish;

snout distinctly longer than distance from eye to ear, one and one-third to one and one-half times diameter of orbit; a slight suggestion of a lateral skin fold; two tubercles at base of tail.

Color in life.—Head dark brown above; body and tail with a median and two lateral rows of irregular light spots; a light brown stripe begins on point of snout, passes through eye, and continues to tail, below which the side is darker, the part bordering directly below almost black; underpart of body canary yellow; occasionally undersurface brownish, flecked with small brown spots.

Measurements of Hemidactylus frenatus Duméril and Bibron.

| | mm. |
|------------------|-----|
| Total length | 117 |
| Snout to vent | 55 |
| Tail | 62 |
| Snout to foreleg | 21 |
| Axilla to groin | 25 |
| Foreleg | 18 |
| Hind leg | 24 |
| Width of head | 12 |
| Length of head | 17 |

Variation.—This species varies chiefly in the number of tubercles on the back, the size and regularity of the granules on the back, the distinctness of the lateral fold which is apparent in certain specimens and absent in others, and the number of labials and preanal pores. The number of pores varies between twenty-eight and thirty-five, the usual number being thirty-two in Philippine specimens; the labials vary between eight and thirteen, eleven being the usual number. In color they vary from a light uniform flesh color to blackish above, either more or less uniform or with a distinct pattern showing spots and distinct laterodorsal lines. These color changes depend somewhat on light and environment. At night in artificial light, they are flesh color when on white walls and rather grayish on darker substances; specimens taken in daylight are usually dark, more especially if on trees or in sunlight.

Remarks.—This species is remarkably numerous and is especially common in all types of buildings throughout the Islands. These lizards are regarded as welcome visitors and are of distinct value in destroying cockroaches, mosquitoes, moths, and other insect pests. Unfortunately they do not take to a diet of ants and are of little or no help in destroying these common pests. Their characteristic call is a slight chirping noise, repeated several times rather rapidly. They are not especially shy

and only when closely approached do they endeavor to escape. They live at peace with *Peropus mutilatus* and *Cosymbotus platyurus*, which are usually found in the same habitats. I have observed the three species on the walls of a small living room, each group occupying a more or less definite area. When geckos of two different species attempted the capture of the same moth, the attempt usually ended by the moth escaping and the two geckos engaging in a struggle, which amounts to a bite or two, a few quarrelsome chirps, and one of the parties running away. Not infrequently the tail of one of the combatants is broken off.

They are known to the Filipinos as *butiké* or *tiké* and are not feared. Occasionally, when the tail is regenerated, two tails appear instead of one. When a double or bifid tail is found, it is regarded as an object that brings luck and is frequently carried by the men to the cockpit with the same assurance of luck that a negro feels when carrying the proverbial foot of a graveyard rabbit into a crap game. Many Tagalogs have the superstitious belief that the geckos leave the houses at 6.30 in the evening to kiss the ground.

The species probably occurs in all the Philippine Islands, as well as throughout southern Asia, the Malay Archipelago, South Africa, Madagascar, the islands of the western Pacific and Indian Oceans, and even Mexico.

HEMIDACTYLUS LUZONENSIS Taylor

Hemidactylus luzonensis TAYLOR, Philip. Journ. Sci. § D 10 (1915) 93; 14 (1919) 112, pl. 1, fig. 2, a, b.

Description of species.—(Adult male, No. 1620, E. H. Taylor collection; collected at Manila, 1916, by Edward S. Ruth.) Head flattened; snout rather oviform, more than twice as wide as deep, elongate, little less than twice diameter of eye, one and one-half times the distance of eye from auricular opening; latter distinctly oblique on one side, rather vertical on other; rostral squarish, upright, with a median notch and a cleft nearly half the depth of the scale; nostrils pierced between nasals, separated by two scales; ten upper labials, the last two very small; nine lower labials; mental triangular followed by two pairs of chin shields, the first pair touching one labial and forming a long median suture; second pair in contact with first pair and two labials, but separated from each other by three scales; scales bordering upper and lower labials somewhat enlarged; scales on chin and throat small, those on abdomen imbricate and

larger; snout covered with uniform granules, larger than those on occiput or body; occiput with scattered tubercular granules, rather conical; body with about sixteen irregular rows of trihedral tubercles; latter present also on legs; tail but slightly depressed, with whorls of sharply keeled spines marking annulations, about eight spines in transverse rows at base of tail; below enlarged, broadened, imbricate scales; regenerated part of tail without spines; legs moderate, all digits clawed, without any trace of webs; the distal phalanx rising from near end of toe; latter long, compressed, much deepened near end; nine divided lamellæ under longest toe; seven under longest finger; a distinct lateral fold from axilla to groin; a short series of femoral pores, five on one side, six on the other.

Color in alcohol.—The specimen is uniform, light yellowish brown, with no evidence of marking save a dark spot on the snout.

Measurements of Hemidactylus luzonensis Taylor.

| | mm. |
|--------------------------------|------|
| Total length, tail regenerated | 123 |
| Width of head | 10.5 |
| Length of head | 18 |
| Snout to vent | 58 |
| Foreleg | 22.5 |
| Hind leg | 29.5 |

Variation.—The variation noted among specimens is largely in the markings. The live specimens examined usually exhibited a series of large, dim, dark blotches on the back, alternating with lighter markings. Most specimens had the spiny tubercles on the back white. The skin above the auricular opening forms a rather indistinct flap, or fold (scarcely noticeable in preserved specimens), which is usually held distended in living or freshly killed specimens; this character is plainly evident. The fold of skin on the sides of the body is prominent in living specimens and is shown clearly in the figures.

Remarks.—Evidently rare; most closely allied to *Hemidactylus depressus*, but easily distinguished by the longer snout, the character of the tail, the preanal pores, and the absence of webs on the feet. Known only from Manila and Jala Jala, Luzon, with Manila the type locality. The type is No. 1774, Bureau of Science collection.

HEMIDACTYLUS GARNOTII Duméril and Bibron

Hemidactylus garnotii DUMÉRIL and BIBRON, *Erp. Gén.* 3 (1836) 368; BAVEY, *Mem. Soc. Linn. Normand.* 15: 13; BOULENGER, *Proc. Zool. Soc. London* (1883) 118, pl. 22, figs. 1, 1a; *Cat. Liz. Brit. Mus.* 1 (1885) 141; STEJNEGER, *Proc. U. S. Nat. Mus.* 21 (1899) 792.

- Hoplopodion (Onychopus) garnotii* FITZINGER, Syst. Rept. (1843) 104.
Doryura vulpecula GIRARD, Proc. Acad. Nat. Sci. Philadelphia (1857) 197; U. S. Explor. Exped., Herp. (1858) 268, pl. 24, figs. 17-24.
Hemidactylus ludekingii BLEEKER, Nat. Tijds. Ned. Ind. 16 (1859) 27.
Doryura gaudama THEOBALD, Journ. Linn. Soc. 10 (1870) 30.
Hemidactylus (Doryura) mandellianus STOLICZKA, Journ. As. Soc. Bengal 41 (1872) 101, pl. figs. 1, 2.

Description of species.—(From No. 487, E. H. Taylor collection; collected at Sumagui, Mindoro, on the Liddell Plantation, May 2, 1916, by E. H. Taylor.) Head elongate, rather flat, longer than broad, the forehead slightly concave; snout obtusely pointed, longer than the distance to auricular opening; eye rather large, little less than its distance from auricular opening, contained one and two-third times in length of snout; rostral much wider than high, bending back over snout, half divided by a

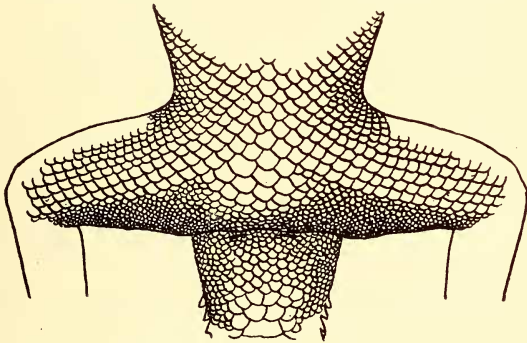


FIG. 5. *Hemidactylus garnotii* Duméril and Bibron, femoral region; $\times 3$.

median suture, followed by two supranasals separated by a median scale; nostril pierced between rostral, first labial, and three nasals, supranasals largest; twelve upper labials and ten lower; scales above labials somewhat enlarged; snout covered with subequal granules larger than those on back of head and body; a large triangular mental, deeper than broad, followed by two pairs of chin shields, first pair touching two labials and in contact with each other; second pair in contact with first, but separated from labials by a row of slightly enlarged scales and from each other by several small granular scales; scales on neck and chin very small; granules on body small, intermixed with larger granules; latter most prominent laterally; a small fold of skin along either side of abdomen; about thirty rows of imbricate scales across belly, between the folds; tail elongate, depressed, much narrower than body, with a denticulate lateral

fringe; scales above in small equal rows, annulations not evident; below with a median series of enlarged, transversely elongated plates; legs moderate; digits with a slight trace of webs, dilated at ends, all with small claws; the lamellæ below divided medially and arranged obliquely, about ten under fourth finger; thirteen under fourth toe; first finger and toe very much reduced in size.

Color in life.—Brownish gray above, reticulated strongly with darker; two indistinct longitudinal series of lighter spots on either side; legs and head lighter; below yellowish white with a wash of canary yellow; infradigital lamellæ dark.

Measurements of Hemidactylus garnotii Duméril and Bibron.

| | mm. |
|--|------|
| Total length, part of tail regenerated | 106 |
| Snout to vent | 53 |
| Length of head | 15 |
| Width of head | 10 |
| Width of body | 11 |
| Foreleg | 18 |
| Hind leg | 21.5 |

Variation.—A second specimen from the same locality agrees remarkably well with the specimen described; it is also a female. Each contains two undeveloped eggs. There are no preanal pores, but there is a continuous series of preanal and femoral scales, each with a distinct depression or perforation, eighteen on each side, which probably represent the number of pores in the male.

Remarks.—Rare in the Philippines, the only definite localities being Sumagui, Mindoro, and Montalban, Rizal. Boulenger reports a specimen from the "Philippines," no exact locality being given. Stejneger,* in his work on Hawaiian reptiles, has separated *H. garnotii* Duméril and Bibron from *Doryura gaudama* Theobald, on the basis of the absence of femoral pores in the former. He states:

I have left out of the synonymy of this species all references to specimens from India, Burma, and Sumatra, since Theobald described his *Doryura gaudama* as possessing nineteen femoral pores, while the true *H. garnotii* appears to be entirely destitute of femoral pores.

* Proc. U. S. Nat. Mus. 21 (1899) 792. Stejneger lists thirty-five specimens, which it appears he examined, but does not state whether they are males or females. It would appear that dissection might have determined the matter beyond a doubt; it is not unreasonable to suppose that only females would occur in such a series. I recently collected twenty-eight specimens of a species of *Lepidodactylus* on a very tiny island on the shore of Basilan, all of which proved to be females not only by the absence of femoral pores but by actual dissection of most of the specimens.

Barbour has regarded the specimens from Java as belonging to *H. garnotii*, and de Rooij has included Hawaiian specimens under the same name as those from Java, Borneo, and the Asiatic mainland. Whether Stejneger is correct or not I cannot say. His statement, "the true *H. garnotii* appears to be entirely destitute of femoral pores," is not conclusive.*

Genus COSYMBOTUS Fitzinger

Platyurus OKEN, Allgem. Naturges. 6 (1836) 641.

Cosymbotus FITZINGER, Syst. Rept. (1843) 104.

Crossurus GIRARD, U. S. Expl. Exped., Herp. (1858) 281.

Nycteridium GÜNTHER Rept. Brit. India (1864) 111.

Digits partly webbed, well developed, all with terminal, free, compressed, clawed phalanges; lamellæ below digits divided; body with a flaplike lateral expansion; tail flattened, with lateral denticulate fringe; pupil vertical; preanal and femoral pores in continuous series.

This genus differs from *Hemidactylus* in the presence of a cutaneous expansion along each side of the body. There is but one species.

COSYMBOTUS PLATYURUS (Schneider)

Stellio platyurus SCHNEIDER, Amph. Phys. 2 (1792) 30; Denkschr. Akad. München (1811) 62, pl. 1, fig. 3.

Lacerta schneideriana SHAW, Gen. Zool. 3 (1802) 278.

Gecko platyurus MERREM, Syst. Amph. (1820) 41.

Gecko marginatus CUVIER, Règ. Anim. ed. 2, 2 (1829) 54.

Hemidactylus platyurus WIEGMANN, Nova Acta Caes. Leop.-Carol. I 17 (1835) 238; CANTOR, Cat. Mal. Rept. (1847) 24; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 143; BOETTGER, Ber. Senck. Nat. Ges. (1886) 95; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 34.

Cosymbotes platyurus STEINDACHNER, Reise Novara, Rept. Wien (1869) 13.

Hemidactylus marginatus GRAY, Griff. A. K. 9: 51; DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 370, pl. 30, fig. 2.

Hoplopodion (Cosymbotus) platyurum FITZINGER, Syst. Rept. (1843) 104.

Crossurus platyurus GIRARD, U. S. Expl. Exped., Herp. (1858) 281.

Nycteridium schneideri GÜNTHER, Rept. Brit. India (1864) 111.

Nycteridium himalayanum ANDERSON, Journ. As. Soc. Bengal 40 (1871) 15.

Nycteridium platyurus STOLICZKA, Journ. As. Soc. Bengal 41 (1872) 103.

Cosymbotus platyurus STEJNEGER, Bull. U. S. Nat. Mus. 58 (1907) 178; BARBOUR, Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 81; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 370.

* Since the above was written I have examined a male specimen of *H. garnotii* from Ifugao, Luzon, which has distinct, well-developed series of preanal pores.

Description of species.—(From No. 282, E. H. Taylor collection; collected at Hinigaran, Occidental Negros, November, 1914, by E. H. Taylor.) Head normally oviform, a broad shallow groove on forehead with a slight depression behind nostrils; rostral broader than high; nostril bordered by rostral, first labial, two postnasals, and a supranasal; latter bordering rostral, but separated from other supranasal by a large median scale, also bordering rostral; nine or ten upper labials, the anterior five or six broader than high; mental triangular, very large, wider than rostral; nine lower labials; a pair of very large chin shields in contact behind mental, which enters between them; a second pair of chin shields behind first pair, separated from each other by three or four rows of scales and from labials by one or two rows; snout covered with granules larger than those on body; granules on occiput smaller than body granules; latter juxtaposed; scales on lateral flap imbricating, larger than body granules; those on belly larger, imbricating; a long series of femoral and preanal pores in a continuous series, angular mesially, twenty-one on each side, pierced in outer femoral row of scales; tail broad, constricted at base, flattened below, the annulations dimly marked; a series of forty-seven large, transversely widened scales below tail; numerous small granules on either side of the series of transverse plates; a broad, slightly denticulate fringe on each side of tail, with several spinelike scales near its base; a lateral flaplike appendage from axilla to groin; a similar flap on posterior aspect of hind leg; digits well developed, inner toes with a well-developed outer phalanx with claw; four digits nearly half webbed; six to seven lamellæ under longest toe, all except outer divided by a median groove; preanal and femoral scales of females without perforations or depressions.

Color in life.—Dull drab gray above, slightly darker laterally, the dark streak through eye to above shoulder rather prominent, continued dimly along sides; below yellowish white; lamellæ of toes dark; tail with indistinct light marks or bars.

Measurements of Cosymbotus platyurus (Schneider).

| | mm. |
|------------------|-----|
| Total length | 119 |
| Snout to vent | 55 |
| Snout to foreleg | 19 |
| Axilla to groin | 25 |
| Width of head | 11 |
| Length of head | 17 |
| Tail | 64 |
| Width of tail | 9 |
| Foreleg | 23 |
| Hind leg | 27 |

Variation.—The lamellæ under the longest toe vary from seven to ten; under shortest toe from four to six; usually the basal lamella is single. The upper labials vary from nine to twelve, ten being the usual number; lower labials seven to nine, seven being the usual number. The chin shields are sometimes followed by a pair of slightly enlarged scales which might be considered a third pair of chin shields; the second pair of chin shields is sometimes in contact with the labials, sometimes not; the distance between scales of the second pair of chin shields varies, but they are never in contact. The width and thickness of tail vary, as does the width of the transverse plates below. Femoral pores vary between seventeen and twenty-one on each side; twenty is the usual number.

The usual marking of this species is a broad dark line from snout through eye involving ear, and continuing to base of tail, the upper edge of which is broadly dovetailed with the lighter dorsal color; the ground color is drab, minutely speckled with black, and there are two rows of narrow, elongate, rectangular blackish spots from neck to base of tail, usually five present in each row; the tail is barred with narrow, transverse dark bands edged with lighter behind. Regenerated tail wider, with a broader fringe, the scales above irregularly shaped, and not arranged in regular rows; the transverse plates below are longer and narrower.

Remarks.—This species is more diurnal in habit and at the same time more domestic than are the other house lizards. I have never found a specimen away from the immediate locality of human habitation. I failed to find it in the interior of Mindanao. These facts point, I believe, to its comparatively recent introduction into the Islands, probably with the early Malay migrations, if not later. In a house in which I lived in Hinigaran, Negros, the species was incredibly numerous. Three specimens that lived on the undersurface of the dining table were accustomed to appear aboveboard during the meal and would eagerly seize small pieces of bread tossed to them. Sometimes they would approach one's fingers and seize the piece held.

In the Philippines the species is well distributed along coasts and in older communities at some distance from the coast. I have examined some three hundred specimens from about twenty-seven localities.

This species is widely distributed over the East Indian Archipelago and southern Asia. Barbour * has contributed the opinion that the various dermal appendages in the geckos serve no useful

* Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 81.

purpose. I have observed that when a lizard of this species falls from a height, it invariably spreads the lateral appendage and holds the legs extended.

Genus *PEROPUS* Wiegmann

- Peropus* WIEGMANN, Nova Acta Acad. Caes. Leop.-Carol. I 17 (1835) 238; STEJNEGER, Proc. U. S. Nat. Mus. 21 (1899) 796; Bull. U. S. Nat. Mus. 58 (1907) 180.
Dactyloperus FITZINGER, Syst. Rept. (1843) 103.
Peripia GRAY, Cat. Liz. (1845) 158.
Chalinocnemis DUGÉS, La Naturelleza 6 (1883) 312.

Compressed distal phalanx of digits free, rising angularly from edge of dilated portion of toe; lamellæ at distal end of dilation arranged in pairs, divided by a median groove; a fold of skin usually present on posterior aspect of hind leg.

Only a single species of this genus is represented in the Philippine fauna.

PEROPUS MUTILATUS (Wiegmann)

- Hemidactylus mutilatus* WIEGMANN, Herp. Mex. 1 (1834) 54.
Hemidactylus (Peropus) mutilatus WIEGMANN, Nova Acta Acad. Caes. Leop.-Carol. I 17 (1835) 238.
Hemidactylus mutilatus DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 354.
Hemidactylus peronii DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 352, pl. 30, fig. 1; CANTOR, Cat. Mal. Rept. (1847) 22; KELAART, Prodr. Faun. Zeyl. (1852) 187.
Peripia peronii GRAY, Cat. Liz. (1845) 159; GÜNTHER, Rept. Brit. India (1864) 110; STOLICZKA, Journ. As. Soc. Bengal 39 (1870) 163, 41 (1872) 103.
Peropus (Dactyloperus) peronii FITZINGER, Syst. Rept. (1843) 103.
Dactyloperus insulensis GIRARD, Proc. Acad. Nat. Sci. Philadelphia (1857) 195.
Peropus mutilatus GIRARD, U. S. Explor. Exp., Herp. (1858) 227; STEJNEGER, Proc. U. S. Nat. Mus. 21 (1899) 796; Bull. U. S. Nat. Mus. 58 (1907) 180; BARBOUR, Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 81; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 368.
Gecko pardus TYTLER, Journ. As. Soc. Bengal 33 (1864) 547.
Hemidactylus (Peripia) mutilatus PETERS, Mon. Berl. Ak. (1867) 14; ANDERSON, Zool. W. Yunnan 1 (1879) 799.
Peropus packardii COPE, Proc. Acad. Nat. Sci. Philadelphia (1868) 319.
Peripia mutilata GÜNTHER, Proc. Zool. Soc. London (1873) 168; PETERS and DORIA, Ann. Mus. Genova 13 (1878) 370.
Gehyra mutilata BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 148; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 41.

Description of species.—(From No. 1064, E. H. Taylor collection; collected on the Liddell Plantation, Sumagui, Mindoro, May, 1916, by E. H. Taylor.) Head rather broad; rostral wider

than high, with a median cleft above, bordered behind by a pair of large supranasals, which are in contact medially; nostril bordered by rostral, first labial, two or three postnasals, and a supranasal; nine or ten upper labials, the scales bordering them above more or less enlarged; granules on snout rather large, regular, with a few rows of smaller, more-elongate scales above labials; a slight longitudinal depression on forehead, which narrows between nostrils and continues to rostral; a slight depression behind nostrils; eight lower labials, the three anterior ones larger than the upper; last two very small; mental large, triangular, strongly differentiated from adjacent labials; two median chin shields large, more than twice as long as wide, in contact with mental and first lower labial, and forming a long median suture; a second pair of chin shields, one on either side of median pair, elongate, in contact with two labials and first pair of chin shields; behind these two or three rows of somewhat enlarged

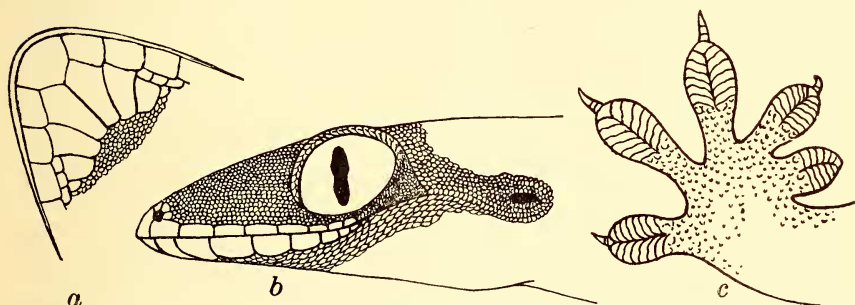


FIG. 6. *Peropus mutilatus* (Wiegmann); after Stejneger; a, chin; b, head, lateral view; c, underside of foot; $\times 4$.

scales bordering labials; chin covered with rounding, imbricate scales, irregular in size, those bordering chin shields smallest; body covered above with small rounding scales, imbricating more or less, those on sides largest and irregular, those on occiput smallest; belly with cycloid, imbricate scales; a doubly curved, continuous series of thirty-eight preanal and femoral pores, angular medially; pores large and oblong; a slight lateral fold suggested and also one on posterior aspect of hind leg; toes slightly webbed at base, widened at tip, with eight pairs of lamellæ under longest toe, seven under shortest toe; tail rather flattened, with broad transverse plates below, and a sharp, finely serrated edge; granules small, not arranged in regular transverse rows; no spines or tubercles; regenerated part of tail wider and flatter, the scales more irregular above, the transverse plates below wider and narrower.

Color in life.—Body uniform lavender-gray to flesh color with a few, indistinct, lighter spots on head; belly flesh color with a wash of canary yellow; lamellæ under toes darker.

Measurements of Peropus mutilatus (Wiegmann).

| | mm. |
|--------------------------------|------|
| Total length, tail regenerated | 110 |
| Snout to foreleg | 19 |
| Snout to vent | 56 |
| Width of head | 12 |
| Length of head | 16 |
| Tail | 54 |
| Foreleg | 15 |
| Hind leg | 18.5 |

Variation.—Almost all specimens examined have a third, outer pair of chin shields, about one-third the size of second pair and joining it, but separated from the labials by one or two rows of small scales. The posterior edges of the chin shields form rather regular curved lines. The preanal and femoral pores vary from seventeen to twenty-one on each side. Stejneger gives the variation as fourteen to nineteen on each side. In certain specimens there is a rather distinct angle formed by the junction of the femorals and preanals. The pores are differentiated by their arrangement, being obliquely placed in opposite directions.

Color variations are marked. Specimens taken in the forest under the bark of trees are usually very much darker, in some cases blackish, with very numerous, dark brown or blackish blotches on back and sides and numerous, scattered, small white spots; labials spotted with white; belly powdered with brown; several specimens examined showed one or two small scales inserted between the supranasals.

Young specimens also are darker, with a row of round yellow dots beginning on snout and continuing in two lines along middle of back to tail; usually there are a few irregular brownish blotches and numerous yellowish flecks; tail barred with brownish, with a few whitish spots near tip.

Remarks.—This species is widely distributed in the Philippines, probably occurring on all of the larger and most of the smaller islands. I have examined more than a hundred specimens, from forty-two localities. The type locality is Manila, but the species is widely distributed, having as wide a range in the Pacific as *Hemidactylus frenatus*. It is found also in Mexico. Its introduction into Mexico was probably not earlier than the sixteenth or seventeenth century when direct commerce

was carried on between the Philippines and Mexico. The Mexican specimen was named *Hemidactylus navarri*, by Dugés,* but undoubtedly it is synonymous with the present species.

Genus **PEROCHIRUS** Boulenger

Perochirus BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 154.

“Digits strongly dilated, slightly webbed, inferiorly with transverse lamellæ, the anterior of which are divided by a median groove, with free, slender, compressed, clawed phalanges raising from within the extremity of the dilated portion; inner finger rudimentary, clawless; inner toe with distinct attached clawed phalange. Body covered above with uniform granular scales, inferiorly with imbricated or juxtaposed scales. Pupil vertical. Males with or without preanal or femoral pores.” (*Boulenger*.)

The genus is known from the Philippines, the Caroline Islands, and the New Hebrides. *Perochirus ateles* (A. Duméril) is the only Philippine species.

PEROCHIRUS ATELES (Duméril)

Hemidactylus ateles A. DUMÉRIL, Arch. Mus. 8 (1856) 462, pl. 18, fig. 9.

Perochirus ateles BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 154.

Description of species.—“Head conical, not distinct from neck; eyes moderate. Twelve upper labials on each side of the rostral, which is higher than broad and extends on the upper part of the snout, the extremity of which is rather acute. Nostrils large. Mental narrow, triangular. Enlarged scutes on the chin, some of which are irregularly arranged in rows along the infralabials. Tail depressed, the borders finely denticulated, covered with granulations same above and beneath and arranged in regular rings. No femoral pores(?). Brownish grey, darker on the tail, the borders of which, above and beneath, are of a rather vivid brown. Total length 150 millim., tail 70.” (*Boulenger*.)

Remarks.—I have examined no specimen of this species. The only known locality is Zamboanga, Mindanao.

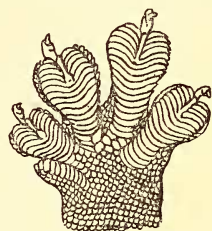


FIG. 7. *Perochirus ateles* (Duméril); after Duméril; foot.

Genus **HEMIPHYLLODACTYLUS** Bleeker

Hemiphyllodactylus BLEEKER, Nat. Tijds. Nederl. Ind. 20 (1860) 327; BOULENGER, Ann. & Mag. Nat. Hist. V 20 (1887) 152; STEJNEGER,

*La Naturaleza 6 (1883) 311, pl. 7.

Proc. U. S. Nat. Mus. 21 (1899) 799; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 46.

Spathodactylus GÜNTHER, Proc. Zool. Soc. London (1872) 594.

Spathoscalabotes BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 156.

Compressed distal phalanx of digits free, rising angularly from within the edge of dilated portion and slightly projecting beyond dilated portion; subdigital lamellæ confined to distal portion of digit; lamellæ divided by a groove; inner digits rudimentary without distal free phalanges, clawless; tail narrow, cylindrical, with no median transverse plates beneath; chin shields but slightly enlarged; pupil vertical; body covered above with minute granular scales; below with imbricate scales.

Stejneger has placed in this genus three species regarded by Boulenger as belonging to *Lepidodactylus* Fitzinger. It appears that the species in question, *Hemiphyllodactylus ceylonensis*, *H. crepuscularis*, and *H. aurantiacus*, are more nearly related to Bleeker's species *H. typus* than to species of *Lepidodactylus*. Stejneger has described a species, *H. leucostictus*, from the Hawaiian Islands. The recently discovered species *H. insularis* is closely related to the latter, if not identical with it.

The typical species, *H. typus*, has been reported from Ticao, Philippine Islands. I am skeptical on the point that the specimen recorded by Parenti and Picaglia * actually belongs to this species, however. Unfortunately I have been unable to obtain a specimen from Ticao, or to examine the one recorded by these authors. Consequently I shall retain the species in the Philippine fauna on the strength of this record.†

Key to the recorded Philippine species of Hemiphyllodactylus Bleeker.

- a¹. Inner digit very small, clawless; males with an angular series of 15 preanal pores; no femoral pores..... *H. typus* Bleeker (p. 69).
- a². Inner digit larger, clawless; males with a curved series of 7 or 8 preanal pores, and a series of 9 to 12 femoral pores.

H. insularis Taylor (p. 66).

HEMIPHYLLODACTYLUS INSULARIS Taylor

PLATE 2, FIGS. 6 and 7

Hemiphyllodactylus insularis TAYLOR, Philip. Journ. Sci. § D 13 (1918) 237, pl. 1, figs. 6, 7, text fig. 4.

* Atti. Soc. Nat. Modena, Mem. Orig. III 5 (1886) 14.

† It will be noted that *Dendrophis punctulata*, *Gecko japonicus*, and *Monitor chlorostigma* have been added to the list of Philippine reptiles on the records of these same authors. Günther's Philippine record of the above-named snake has been relegated to *Dendrelaphis terrificus* by Boulenger. I surmise that the same error obtains in Parenti and Picaglia's record of this species as in Günther's record.

Description of species.—(From the type, No. 490, E. H. Taylor collection; collected at Sumagui, Mindoro, May 20, 1919, by E. H. Taylor.) Head oviform, much longer than broad, less than twice as high as wide; snout slightly longer than its distance from auricular opening, one and one-half times diameter of eye; eye large, pupil vertical; auricular opening small, irregular in shape; rostral much wider than high, subrectangular, slightly notched above; nostril surrounded by rostral, first labial, and three nasals, the upper largest, separated from its fellow by two scales; eleven upper labials, last three minute; eleven lower labials; mental triangular; no distinct chin shields; scales bordering labials below somewhat enlarged; granules on snout distinctly larger than those on back; latter minute, granular, equal; scales on belly cycloid, imbricate, larger than those on body above; no fold on body from axilla to groin; legs rather small, failing to touch when adpressed; digits rather broad, the dilated portion with two series of oblique lamellæ, about four under longest finger, followed by one or two paired scalelike lamellæ; longest toe with four lamellæ followed by two pairs of scalelike lamellæ; a straight series of femoral pores on each side, ten on right, nine on left, and a slightly angular series of eight preanal pores; tail cylindrical, tapering gradually.

Color in life.—General body color light brown above, made up of varicolored scales, brick red, whitish, black, brown, and yellow; a series of dark-edged brick red spots begins behind eye and continues to tail; upper and lower labials dark, with a series of red spots along each jaw; pupil vertical, coppery red; belly and chin yellowish brown, with numerous brown scales. Tail above with a large, basal, black-edged red spot; tail lighter with a dim series of paired lighter spots to tip.

Measurements of Hemiphyllodactylus insularis Taylor.

| | mm. |
|-----------------|------|
| Total length | 56 |
| Snout to vent | 30 |
| Tail | 26 |
| Head length | 9 |
| Head width | 5 |
| Foreleg | 8 |
| Hind leg | 10.5 |
| Axilla to groin | 19 |

Variation.—Very little variation is shown in the three other specimens taken in Mindoro. Five specimens from Cancuman, Dipolod, Marongas, and Bubuan (Tapiian group), in Jolo Archipelago, have been referred to this species. They differ some-

what among themselves in color and also from the type. Specimens from the first three localities are light gray, with a distinct black streak passing above labials through eye, and a second along canthus rostralis also passing through eye, the two meeting medially on back of head; back mottled with darker color, with a distinct dark spot on base of tail above; the light spots (red in the type) are also evident in these specimens. The scales in the first row bordering labials are slightly larger than are those in the type. One specimen is a male with ten and twelve femoral and seven preanal pores. The Bubuan specimen is brown with darker brown reticulations and a short orange line behind eye and small orange spots on

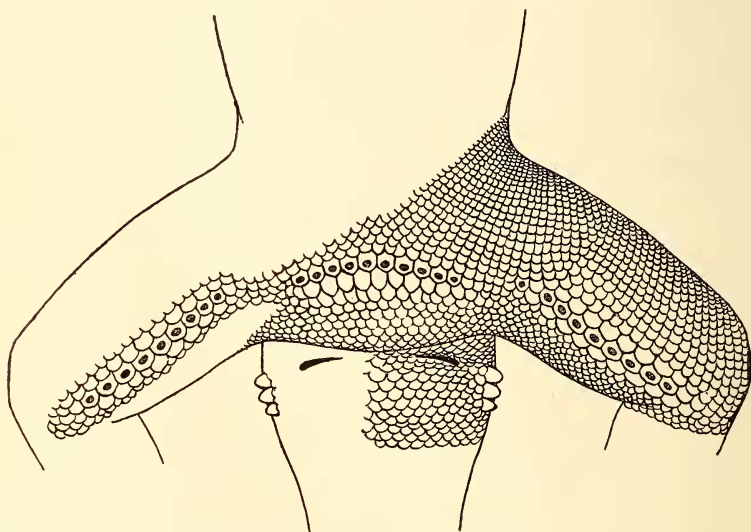


FIG. 8. *Hemiphyllodactylus insularis* Taylor; from the type, from Mindoro; preanal and femoral pores; $\times 10$.

the sides; a dark-edged light mark on base of tail above, as in the type.

Remarks.—This species is very closely allied to *Hemiphyllodactylus leucostictus* Stejneger,* if actually distinct. I have examined Hawaiian specimens, and Stejneger's excellent description and drawings of the type are at hand. The following differences are evident from a comparison of the species: The anterior labials are larger, and the posterior smaller, than in *H. leucostictus*; the eye is nearer the ear opening than the end of the snout; the lateral scales on the tail are not pointed and raised; the preanal pores are in a curved, instead of an angular, series.

* Proc. U. S. Nat. Mus. 21 (1899) 800, figs. 7 to 9.

There are two or (usually) three scales separating the supranasals.

The specimens from Sulu Archipelago had the chin shields slightly enlarged, and in one specimen a single large shield followed the mental.

All of these specimens were found along the seashore under the bark of trees which were exposed to the sun and the bases of which were usually reached by the sea water at high tide. Two small eggs are laid. These are joined to each other and attached under the bark of trees. The eggs are rather dirty or brownish white; the undeveloped eggs in the females are brown.

Known only from Mindoro and Sulu Archipelago. It is possible that the specimen of the genus reported by Parenti and Picaglia from Ticao is also of this species.

HEMIPHYLLODACTYLUS TYPUS Bleeker

PLATE 4, FIG. 2

Hemiphyllodactylus typus BLEEKER, Nat. Tijds. Nederl. Ind. 20 (1860) 327; BOULENGER, Ann. & Mag. Nat. Hist. V 20 (1887) 152; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 46.

Spathodactylus mutilatus GÜNTHER, Proc. Zool. Soc. London (1872) 594.

Spathoscalabotes mutilatus BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 157, pl. 13, fig. 1; PARENTI and PICAGLIA, Atti. Soc. Nat. Modena, Mem. Orig. III 5 (1886) 14.

Description of species.—"Head more long than broad, oviform; snout as long as the distance between the eye and the ear-opening, one time and a half the diameter of the eye; ear-opening very small, oval, oblique. Rostral broad, nearly pentagonal; nostril bordered by the rostral, the first labial, a supranasal and two or three small scales. Eleven upper and as many lower labials; mental small, triangular; no chin-shields. Body long and slender; covered with small granular scales, those on the snout and the limbs somewhat enlarged. Limbs slender; digits very unequal, free; inner rudimentary, four pair of lamellæ under the other digits. Ventral scales larger, smooth, imbricate. Male with an angular series of 15 praeanal pores. Tail cylindrical, slender, covered with small scales."

Color.—"Brown above, marbled with darker; a dark streak from the tip of the snout to the shoulder, passing through the eye; a series of round whitish spots beginning behind the eye and continued along each side of the body to the tail. Tail lighter brown above with two whitish elongate spots at its base, white below for two-thirds of its length. Lower parts of body

whitish, speckled with brown. Length of head and body 44 mm.; tail 38 mm." (*de Rooij*.)

Measurements of Hemiphyllodactylus typus Bleeker.

| | mm. |
|---------------|-----|
| Total length | 82 |
| Head | 10 |
| Width of head | 6.5 |
| Body | 34 |
| Foreleg | 11 |
| Hind leg | 15 |
| Tail | 38 |

Remarks.—This species has been included on the strength of Parenti and Picaglia's record. Their specimen was from Ticao Island near southern Luzon. Apparently, the species grows to a larger size than *Hemiphyllodactylus insularis*. The species is known to occur in Borneo, Java (the type locality), Sumatra, Simalur, and Nias.

Genus LEPIDODACTYLUS Fitzinger

Platydyctylus DUMÉRIL and BIBRON, *Erp. Gén.* 3 (1836) 290, part.

Lepidodactylus FITZINGER, *Syst. Rept.* (1843) 98; BOULENGER, *Cat.*

Liz. Brit. Mus. 1 (1885) 162, part.

Amydosaurus GRAY, *Cat. Liz.* (1845) 162.

Peripia GÜNTHER, *Rept. Brit. India* (1864) 110, part.

Digits dilated, free or with a rudiment of a web; below with transverse lamellæ, the outer divided by a median groove; a very short, compressed, distal, clawed joint rising from the extremity of dilated portion of toe, inner without claw; body covered with granular scales above, below with juxtaposed or subimbricating scales; pupil vertical; males with preanal or femoral pores.

The genus is widely distributed throughout the East Indian Archipelago, Polynesia, and southwestern Australia. It is represented in the Philippines by eight species.

Key to the Philippine species of Lepidodactylus Fitzinger.

*a*¹. Rostral enters nostril.

*b*¹. Upper labials, 14; lower labials, 15; no femoral pores; 9 preanal pores on each side, forming a doubly arched series, angular medially; tail cylindrical..... *L. labialis* (Peters) (p. 85).

*b*². Upper labials, 13 or 14; lower labials, 12 or 13; an unbroken angular series of 12 preanal pores, 6 on each side; tail nearly circular in cross section, slender, sharply swollen at base.

L. brevipes Boettger (p. 74).

*b*³. Upper labials, 12; lower labials, 11 (type description does not mention pores or pore scales); tail with a lateral, flaplike, free margin; digits wide in proportion to length..... *L. planicaudus* Stejneger (p. 75).

- b⁴. Upper labials, 11; lower labials, 10; preanal and femoral pores arranged in a continuous series, angular medially, 19 on each side; tail with narrow, lateral, denticulate fringe.

L. aureolineatus Taylor (p. 83).

- b⁵. Upper labials, 12; lower labials, 12; preanal pore scales, 32 to 35, arranged in a continuous angular series (representing pores in males?); tail wider than deep, rounding above, flattened below; a very slight, dimly serrated, lateral edge.

L. divergens Taylor (p. 71).

- b⁶. Upper labials, 10 to 12; lower labials, 10; preanal pores, 21 to 24, angular medially; tail rather cylindrical, slightly flattened above and below; no lateral fringe..... *L. woodfordi* Boulenger (p. 78).

- a². Rostral separated from nostril.

- b¹. Upper labials, 13 or 14; lower labials, 11; tail flattened, laterally with a broad denticulate fringe; digits with large distinct webs; slight fringe on femur..... *L. christiani* Taylor (p. 81).

- b². Upper labials, 13 or 14; lower labials, 13; preanal pores, 25, forming a median angle; tail rather cylindrical, with a distinct lateral fringe; rudiment of web between digits.

L. naujanensis Taylor (p. 76).

The species of this genus are diminutive geckos. Some species, for example *L. christiani*, *L. naujanensis*, and *L. aureolineatus*, are strictly arboreal in their habitats. *Lepidodactylus woodfordi* was usually found under logs or coral rocks on the seacoast, away from vegetation; this species feeds on small crabs and other small crustacea. *Lepidodactylus divergens* was found among bare rocks exposed to the sun. The last two species seem to be rather gregarious in habit. *Lepidodactylus planicaudus* was taken at a higher altitude than is recorded for any other species of this family in the Philippines. No species has been recorded from Palawan. I have, however, on two occasions observed specimens of a small gecko while collecting in Palawan, which I believe belong to this genus. They were found under the leaves of closely clinging vines on forest trees, and were exposed by tearing down the vines. Very probably a new species of the genus awaits discovery on Palawan.

LEPIDODACTYLUS DIVERGENS Taylor

PLATE 2, FIGS. 1 TO 3

Lepidodactylus divergens TAYLOR, Philip. Journ. Sci. § D 13 (1918) 242, pl. 1, figs. 1-3.

Description of species.—(From the type, No. 1554, Bureau of Science collection; collected on Little Govenen Island, Sulu Archipelago, October, 1917, by E. H. Taylor.) Head elongate, oviform; snout rather flattened, with a median groove; rostral more than twice as wide as high, rather low medially above,

but raised on each side in front of nostrils; nostril surrounded by rostral, first labial, two supranasals and a large postnasal; the supranasals bordering rostral separated by three equal-sized scales; twelve upper labials; a row of scales bordering upper labials above, somewhat enlarged; twelve lower labials; mental longer but narrower than adjacent scales; a group of enlarged shields under point of chin, the three pairs following mental largest; almost all enlarged scales on chin are anterior to a line drawn across chin from the sutures between fourth and fifth labials; granules on throat small, about equal to those on occiput; granules on back slightly larger than those on occiput and somewhat irregular in size; scales on belly cycloid, imbricate; in the preanal region a long series of thirty-four preanal scales, angular medially; tail much wider than deep, rounding above, narrowed noticeably at base, flattened below, with indications of a slightly sharp, dimly serrated, lateral edge; scales arranged in transverse rows, those above much smaller than those below, the annulations only dimly marked; legs fairly well developed; digits well developed, except inner, which lacks the distal phalanx and claw; digits slightly wider distally, about ten lamellæ under inner toe, the outer lamella single, the five following divided by a median suture; fifteen lamellæ under fourth toe, the five outer divided; diameter of eye two and one-fifth times in distance from eye to snout; distance of eye to ear much less than distance from eye to end of snout.

Color in life.—Above russet to darker brown with numerous darker narrow zigzag lines, nine or ten from occiput to base of tail, with lighter areas between them; broad darker bands on tail, about eight to tip; a dark brown line from nostril through eye, which broadens slightly and continues some distance on neck; a yellow line above the brown, quite distinct behind eye; a row of yellow spots dorsolaterally, from neck to base of tail; a few yellow flecks laterally; below yellowish, speckled with brown; variegated reddish brown on underside of tail.

Measurements of Lepidodactylus divergens Taylor.

| | mm. |
|------------------|------|
| Total length | 80 |
| Snout to foreleg | 16.5 |
| Snout to vent | 41.5 |
| Tail | 38.5 |
| Axilla to groin | 20 |
| Width of head | 7.3 |
| Length of head | 12 |
| Foreleg | 11.2 |
| Hind leg | 16.2 |

Variation.—Table 5 shows clearly the variations in a series of specimens of nearly equal size. Twenty-five specimens were taken, and all are females. All except two were taken on Little Govenen Island. These all show the characteristic zigzag markings, and usually three short longitudinal stripes are present between the shoulders; the series of yellow spots are present on all specimens taken; the three scales between the supranasals are frequently replaced by a single large scale; there is also variation in the arrangement of the chin scales, but the three pairs following the mental are usually largest. There is slight variation in the comparative length of the snout; sometimes the diameter of the eye is contained less than twice in the eye-to-snout distance. The regenerated tails are flatter, and have a sharper, more prominent, serrated edge than those of normal specimens.

Remarks.—Not a single male specimen was found.* This is especially surprising in view of the fact that so large a series was taken and in such a restricted locality. No explanation seems possible save that the males have different habits than the females and occupy some habitat that could not be discovered. All specimens seen were captured, so it could not be explained by their greater agility in escaping capture.

Little Govenen is an extremely small island lying less than a kilometer from the southwest coast of Basilan. It contains only a few hundred square meters of land and rises to an elevation of about 15 meters. On my first visit twelve specimens of this species were taken on the bare rocks that jut from one side of the island. Examination showed that apparently all of these were females, and later a special trip was made to the island for the purpose of discovering the males. On this trip the entire island was searched and eleven specimens were taken; these too were females. Later two more specimens were found on Bubuan Island and these also were females.

Many of the specimens contained partly developed eggs and the sex of these could not be questioned; certain other specimens were dissected by myself, and others by Dr. E. S. Ruth, of the University of the Philippines, who pronounced all of them females.

This is another species "closely allied to *L. lugubris*," but it differs from the latter in several points. There is a much larger series of preanal scales (pores in males?); there are nearly twice

* Of fifteen specimens of *Lepidodactylus lugubris* listed by Boulenger, Cat. Liz. Brit. Mus. 1 (1885) 165 and 166, only one is a male.

as many lamellæ under fourth toe (fifteen in the type); the color pattern is distinctly different; the body is crossed by a series of zigzag lines instead of having two median rows of spots; and there is the invariable series of very small yellow spots dorsolaterally on the body. A comparison of descriptions shows other differences.

TABLE 5.—Measurements and scale counts of *Lepidodactylus divergens* sp. nov.

| No. | Locality. | Sex. | Length, snout to vent. | Head. | |
|-------------------------|---------------------|------|------------------------|---------|--------|
| | | | | Length. | Width. |
| | | | mm. | mm. | mm. |
| 1542..... | Little Govenen..... | ♀ | 40 | 11 | 7 |
| 1543..... | do..... | ♀ | 42.5 | 12 | 7 |
| 1545..... | do..... | ♀ | 43.5 | 12.2 | 7.8 |
| 1544..... | do..... | ♀ | 43 | 12 | 7.2 |
| 1546..... | do..... | ♀ | 44 | 12.2 | 7.3 |
| 1547..... | do..... | ♀ | 42 | 11.5 | 7 |
| 1548..... | do..... | ♀ | 40 | 11.8 | 7 |
| 1549..... | do..... | ♀ | 43.8 | 12 | 7.8 |
| 1550..... | do..... | ♀ | 41 | 11.5 | 7.1 |
| 1551..... | do..... | ♀ | 40 | 11.3 | 7.2 |
| 1554 ^a | do..... | ♀ | 41.5 | 12 | 7.3 |

| No. | Axilla to groin. | Foreleg. | Hind leg. | Labials. | | Prenal scales. |
|-------------------------|------------------|----------|-----------|----------|--------|----------------|
| | | | | Upper. | Lower. | |
| | mm. | mm. | mm. | | | |
| 1542..... | 17.3 | 12.2 | 16 | 11-12 | 11-12 | 33 |
| 1543..... | 20.8 | 13 | 15.6 | 12-13 | 11-12 | 33 |
| 1545..... | 22 | 12.5 | 16.2 | 11-12 | 11-13 | 32 |
| 1544..... | 20.2 | 14.5 | 17 | 12 | 12 | 35 |
| 1546..... | 22.6 | 13.2 | 17 | 12-13 | 12 | 33 |
| 1547..... | 22.2 | 12.2 | 17.5 | 12 | 12 | 32 |
| 1548..... | 21.8 | 12 | 16.3 | 12 | 11-12 | 33 |
| 1549..... | 22.8 | 13 | 17.2 | 12 | 12-13 | 32 |
| 1550..... | 20.8 | 12.5 | 16.5 | 12 | 11 | 32 |
| 1551..... | 19.8 | 12 | 15.1 | 12 | 11 | 34 |
| 1554 ^a | 20 | 11.2 | 16.2 | 11-12 | 11-12 | 34 |

^a Type.

LEPIDODACTYLUS BREVIPES Boettger

Lepidodactylus brevipes BOETTGER, Zool. Anz. 20 (1897) 161.

Description of species.—(After Boettger.) Differs from *Lepidodactylus labialis* (Peters) and *L. pulchro* Boulenger in having the body much slenderer, the series of submental scales less distinct, and only twelve preanal pores. Body very slender, head

distinct from neck, much longer than broad; snout acuminate, longer than distance between eye and ear opening, and nearly one and one-half times diameter of eye; anterior part of head with a longitudinal groove; ear opening very small, longitudinally oval; legs short, the foreleg reaches not quite halfway in the distance between axilla and groin; fingers and toes moderately elongated, free, the inner digit well developed; eleven or twelve subdigital lamellæ under middle finger, fifteen or sixteen under middle toe; lamellæ on outer third of toe divided by a longitudinal groove; upper part of body and underside of neck covered with granular scales, which are somewhat larger on snout; scales on belly larger, juxtaposed; rostral quadrangular; nostril surrounded by rostral, first supralabial, and three nasals; the supranasals bordering rostral separated from each other by two small scales; thirteen to fourteen upper labials; twelve to thirteen lower labials; mental small, triangular, smaller than adjacent labials; chin shields distinctly enlarged, not arranged in rows but of variable size and toward back gradually changing into the smaller neck scales; tail, in cross section, nearly circular, slender, sharply swollen at base, regularly covered with transverse rows of smaller granular scales, which do not form distinct annulations.

Color.—Above gray-brown, with darker clouded markings, and on either side a dorsolateral row of about ten small, round white dots; lips and underside of body dirty white or with brownish markings or fine brown dots.

Measurements of Lepidodactylus brevipes Boettger.

| | mm. |
|----------------|------|
| Total length | 73 |
| Length of head | 9 |
| Width of head | 6.75 |
| Length of body | 30 |
| Foreleg | 9 |
| Hind leg | 14 |
| Tail | 34 |

Remarks.—This rare species apparently has not been taken again. The type locality is "Philippines," probably Samar.

LEPIDODACTYLUS PLANICAUDUS Stejneger

Lepidodactylus planicaudus STEJNEGER, Proc. U. S. Nat. Mus. 28 (1905) 348.

Description of species.—(After Stejneger). Closely allied to *Lepidodactylus lugubris*, but tail much more depressed, broader, less tapering, with a lateral, flaplike, free margin and less distinct verticillate arrangement of the caudal scales; digits wider in

proportion to their length; twelve upper labials, eleven lower labials; the first series of slightly enlarged chin scales which join the mental and the anterior lower labials are rather smaller than the next row, while in *L. lugubris* the proportion is reversed, those nearest the mental being largest.

Measurements of Lepidodactylus planicaudus Stejneger.

| | mm. |
|-------------------------------------|------|
| Total length | 78 |
| Tip of snout to vent | 41.5 |
| Vent to tip of tail, tip reproduced | 36.5 |

Remarks.—Stejneger remarks as follows on the species:

Peters has already described a *Lepidodactylus labialis* from Mindanao which is also said be closely allied to *L. lugubris*. It has, however, a "cylindrical tail," and differs from it, consequently, in just the opposite way of our species. In the latter the tail is usually depressed and instead of tapering gradually toward the tip, the edges are practically parallel for quite a distance and then tapering off much more quickly. Instead of the "sharpish" lateral edge of the Polynesian *L. lugubris*, our specimen has a lateral free margin edged with a series of nearly uniform small spines which show no definite verticillate arrangement. The digits are wider and clumsier, hence look shorter than in *L. lugubris*, and the laminæ under the basal joints are better defined.

The type was collected by Dr. E. A. Mearns, June–July, 1904, at an elevation of from 1,300 to 2,000 meters, on Mount Apo, Mindanao; the type remains unique.

LEPIDODACTYLUS NAUJANENSIS Taylor

Lepidodactylus naujanensis TAYLOR, Philip. Journ. Sci. 14 (1919) 113.

Description of species.—(From the type, No. 2006, E. H. Taylor collection; collected April 25, 1916, at Lake Naujan, Mindoro, by E. H. Taylor.) Rostral low, more than twice as broad as high, not entering nostril; latter surrounded by first labial and five nasal scales, forming a rounded prominence; the postnasal bordering second labial largest of the five; supranasals separated by two series of three scales, all about the same size as the nasal scales; a rather distinct groove on front end of snout; thirteen or fourteen upper labials; thirteen lower labials; angle of mouth extending scarcely behind posterior vertical of eye; mental scarcely larger than adjacent scales; chin covered with many somewhat enlarged scales, about thirty-five, which fill all the space in front of a line drawn across jaw between fifth lower labials; granules on snout larger than those on body; back and sides covered with minute granular scales with scattered, slightly larger, spinelike scales, which are yellow; these

also occur on back part of head and neck; tail rather cylindrical, with a distinct lateral denticulated fringe, the annulations marked by an enlarged spinelike scale in the lateral fringe; scales on upper surface of tail distinctly larger than those on body, those on underside still larger; scales on belly imbricate, much smaller than those under tail; a long series of twenty-five preanal and femoral pores forming a median sharp angle; pores elongate in shape; legs well developed, the adpressed hind leg reaching the wrist of the adpressed foreleg; web between toes and fingers very rudimentary; fourteen lamellæ under longest toe; toes much wider at end than at base, the basal lamellæ rather scalelike; inner digits on legs well developed, without claws; eye nearer ear than end of snout; ear slightly nearer eye than foreleg.

Color in life.—Reddish brown above with dim zigzag darker marking of brown across back; lighter at base of tail; a dark line between eyes and another on nose; sides darker, with minute yellow spots; a more or less distinct row of yellow dots borders belly from axilla to groin; belly canary mixed with brown scales; underside of tail yellow at base, grayish at tip; lower part of eye dark.

Measurements of Lepidodactylus naujanensis Taylor.

| | mm. |
|------------------|------|
| Length | 74 |
| Snout to vent | 34 |
| Snout to foreleg | 12 |
| Tail | 40 |
| Axilla to groin | 16 |
| Foreleg | 10 |
| Hind leg | 13.5 |
| Width of head | 5.1 |
| Length of head | 9.3 |

Variation.—Two other adult specimens, both females, were taken. The following variations are in evidence: One specimen has fourteen and thirteen upper labials; twelve lower labials; the internasal scales are reduced to one large median scale, with a pair of smaller scales on each side; the angle of the mouth fails distinctly to reach the posterior vertical of eye; no preanal pores, but a series of twelve enlarged scales on each side, angular medially, representing the pore scales; a series of distinct, large black spots on each side of the tail just above the lateral fringe. In the other specimen, the internasal scales are similar to those in the type save that the second row has four instead of three scales; upper labials, thirteen and fourteen; lower labials, twelve; there are calcareous deposits on the sides of the neck.

Young.—Six pairs of small eggs were found attached to various trees under the bark. These were brought to Manila and, with no especial care, ten young were hatched. These were very lively, but owing to their inability to obtain suitable food all died soon or were preserved. They were uniform grayish brown in color; the largest measured 32.5 millimeters in length, the smallest 29, on emerging from the egg. The eggs are smooth and white, and are flattened on the sides by which they are attached to each other and to the trees. A great many of these eggs were found but most of them were destroyed while being removed from their resting places.

Remarks.—This species is related to *L. christiani* Taylor, as shown by the arrangement of the nasals and the separation of the nostril from the rostral. The species described differs, however, in the smaller development of the web between the toes; and in the absence of a fringe on the femur; the tail is essentially different. The types and cotypes are from Lake Naujan, Mindoro; they were found under leaves of small climbing vines on trees. Other specimens observed escaped. The habitat is identical with that of the small *Siaphos kempi* Taylor, from the same locality. On two occasions the two species were observed on the same tree.

LEPIDODACTYLUS WOODFORDI Boulenger

PLATE 2, FIGS. 4 AND 5

Lepidodactylus woodfordi BOULENGER, Proc. Zool. Soc. London (1887) 334, pl. 28, fig. 1; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 51; TAYLOR, Philip. Journ. Sci. § D 13 (1918) 239, pl. 1, figs. 4, 5.

Description of species.—(From No. 1541, Bureau of Science collection; collected on Sipayan Island (near Tawitawi), November 6, 1917, by E. H. Taylor.) Head oviform, with a broad, shallow groove on snout; a distinct depression between nostrils; rostral bent back over point of snout, broadly entering nostril, highest at suture with internasal; nostril surrounded by rostral, first labial, a supranasal, and two postnasals; supranasals separated by a single large scale, with a pair of small scales on each side; ten to twelve upper labials; mental differentiated in shape but not larger than adjacent labials; ten lower labials, the last two or three of both upper and lower labials very small; largest chin scales are four in number, one pair bordering mental, the second immediately posterior to first pair; these scales are not equal, but vary in size; other scales touching them are smaller, rounding; granules on snout much larger than those on occiput

or body; scales on belly large, cycloid, imbricate; scales on tail arranged in transverse series, larger below than above, all larger than those on body; annulations indistinctly marked by series of slightly enlarged scales; scales on regenerated portion of tail irregular, annulations not marked; in the preanal region a continuous series of twenty-four preanal scales, forming an angle medially and representing the number of preanal pores in male; legs moderately long, meeting when adpressed; digits well developed; inner toe long, well developed, lacking terminal digit and claw; third and fourth toes nearly equal; digits widened at ends, rather slender proximally, only a slight trace of web present; nine lamellæ under inner toe, the first single, the four following divided, the last four narrower, rather scalelike; twelve under fourth toe, the first four divided, followed by three broad undivided lamellæ, these in turn followed by five scalelike lamellæ on proximal portion of digit, not extending to base; eye large, distinctly nearer ear than snout, its diameter about one and one-half times in its distance from snout; ear opening very small, somewhat larger than nostril; tail rather cylindrical, noticeably flattened above and below, with a slight medial depression above and below; no lateral fringe, but the scales on outer edge slightly raised.

Color in life.—Above gray, with variegated scales of brownish and black, and six irregular, black, zigzag lines across back, with lighter color between them; one or two indistinct darker lines across snout, and a few dark markings on occiput, a distinct black line from nostril through eye, which continues above ear to foreleg; tail pinkish gray, with a series of dim, transverse, darker bars and a row of median black spots, also lateral rows of spots; below nearly uniform yellowish cream; labials with lighter spots.

Measurements of Lepidodactylus woodfordi Boulenger.

| | mm. |
|------------------------|------|
| Total length | 71 |
| Snout to vent | 35.5 |
| Axilla to groin | 17.5 |
| Tail (tip regenerated) | 35.5 |
| Length of head | 9.5 |
| Width of head | 7 |
| Foreleg | 9.8 |
| Hind leg | 14.5 |

Variation.—The seventeen specimens at hand show comparatively little variation; pores or pore scales vary from twenty-one to twenty-five; average, twenty-three. Occasionally they form a broad angle medially, but usually the series is curved; the two

median scales are largest, and frequently are slightly separated from each other. The upper and lower labials vary between ten and twelve. The scales between the supranasals are usually reduced to one large circular scale (four specimens only show exception). The arrangement of the chin scales is usually in two irregular, curved rows; most of the enlarged scales are anterior to a line drawn from the posterior part of the third labial across jaw. The tail is wider than deep in cross section; the regenerated tails have the scales arranged irregularly, the annulations not marked.

In color the specimens range from brown, with rather heavy, dark, zigzag bars, shading to lighter bars between them, to very light gray specimens with a very few darker markings on back and no trace of zigzag lines; the young are dark laterally.

TABLE 6.—Measurements and scale counts of specimens of *Lepidodactylus woodfordi* Boulenger.

| No. | Locality. | Sex. | Length, snout to vent. | Head. | |
|-------------------------|------------------------|------|------------------------------|---------|--------|
| | | | | Length. | Width. |
| | | | mm. | mm. | mm. |
| 1526..... | Santa Cruz Island..... | ♂ | 40 | 10 | 6.8 |
| 1527..... | do..... | ♂ | 39 | 10 | 7.5 |
| 1529..... | Great Govenen..... | ♀ | 41 | 10.2 | 7.3 |
| 1530..... | Bubuan..... | ♀ | 40 | 10 | 7.1 |
| 1531..... | do..... | ♀ | 37 | 10 | 7.2 |
| 1532..... | do..... | ♂ | 38 | 10 | 7.2 |
| 1534..... | do..... | ♂ | 40 | 10 | 7.5 |
| 1537..... | do..... | ♀ | 36 | 9.2 | 6.3 |
| 1540..... | Dipulod..... | ♂ | 35 | 9 | 7 |
| 1541 ^a | Sipayan..... | ♀ | 35.5 | 9.5 | 7 |

| No. | Axilla to groin. | Foreleg. | Hind leg. | Upper labials. | Lower labials. | Prenal scales or pores. |
|-------------------------|---------------------|----------|-----------|-------------------|-------------------|-------------------------------|
| | mm. | mm. | mm. | | | |
| 1526..... | 20 | 10.5 | 16.2 | 10 | 11-12 | 24 |
| 1527..... | 18 | 11.8 | 17 | 11 | 10 | 21 |
| 1529..... | 21.2 | 11.5 | 16 | 11 | 11 | 22 |
| 1530..... | 20 | 12 | 16 | 10-11 | 11-12 | 23 |
| 1531..... | 19 | 11 | 15.6 | 12 | 11 | 25 |
| 1532..... | 20 | 11.2 | 15.4 | 11 | 11 | 23 |
| 1534..... | 20 | 12 | 17 | 12-12 | 11 | 24 |
| 1537..... | 19.1 | 10 | 14 | 10 | 10-11 | 24 |
| 1540..... | 17 | 11 | 15.5 | 11-10 | 12-10 | 22 |
| 1541 ^a | 17.5 | 9.8 | 14.5 | 10-12 | 10 | 24 |

^a Specimen described.

Remarks.—I have referred this group of specimens to Boulenger's species, since I can find no differences of any importance between them and the published description and drawings of

the type by Boulenger.* The color pattern shown on Boulenger's figure is almost identical with the markings of living adult specimens taken by me. If the specimens are correctly identified, as I believe they are, they represent an interesting addition to the Philippine fauna. The nearest territory where the species is known is New Guinea. The type locality is Faro Island, Solomon Islands.

LEPIDODACTYLUS CHRISTIANI Taylor

PLATE 3, FIG. 1

Lepidodactylus christiani TAYLOR, Philip. Journ. Sci. § D 12 (1917) 368, pl. 2, fig. 1, a, b.

Description of species.—(From the type, No. 900, E. H. Taylor collection; collected on Mount Canlaon, Negros, December 23, 1915, elevation about 700 meters, by E. H. Taylor.) Head not distinct from neck, probably due to abnormal deposits of calcareous matter under the skin of the neck on both sides; snout rather long, almost twice diameter of eye; distance from nostril to eye equal to, or minutely longer than, distance from eye to auricular opening; auricular opening on left side abnormally wanting, due to calcareous deposits; rostral more than twice as wide as long, its upper margin irregular; nostril bordered by first labial, a large postnasal, which is in contact with two labials and three supranasals (four on right side); these scales form a rounded prominence about nostril; the supranasals completely separate rostral from nostril; anterior supranasal in contact with first labial; between nasals, immediately behind rostral, are three rather enlarged, rounded scales, and a small, probably anomalous, scale; thirteen or fourteen upper labials, last two very small; angle of mouth without differentiated labial scales; two superimposed, enlarged scales behind postnasals, followed by a row of irregularly enlarged scales bordering labials; eleven lower labials; a row of small rounded scales bordering lower labials, those touching mental smallest, two or three rows of smaller scales bordering these; scales on forehead granular, much larger than those on body; ear opening small, its greatest diameter equal to one-third or one-fourth diameter of eye, nearer eye than foreleg; eye large, pupil vertical; dorsal and lateral scales granular, minute; ventral scales rounded, somewhat imbricate and larger; a long continuous line of twenty-six enlarged scales in preanal and femoral region; the nine median largest,

* Boulenger states that his specimen has no distinct web, but his fig. 12 shows a distinct rudiment, such as is present in Sulu specimens.

in a somewhat curved line, some of the scales apparently perforated with small pores; it is not improbable that the twenty-six enlarged scales represent the number of pores in the male; a few rows of enlarged scales behind this row in front of anus; tail much flattened, especially below, bordered on sides by a broad denticulate fringe, the annulations scarcely distinguishable; scales below rounding and distinctly larger than those above; tip of tail regenerated; this has the fringed edge, but the serrations are smaller, and the scales above and below are not arranged regularly; foreleg pressed forward reaches anterior border of eye; no distal phalanx on inner digits, others with clawed distal joints rising from near the broadened extremity of digit; lamellæ on broadened portion of digits divided by a median groove; strongly denticulate on outer edge; these divided lamellæ followed by undivided scalelike lamellæ, decreasing in width; fourth toe with eight or nine lamellæ, the first four divided; digits of both legs with webs; a slight web behind the hind leg.

Color.—Above ashy gray to blackish brown on back, sides of arms, and tail; snout darker, with a dark line passing through lower part of eye to shoulder; below lighter, flecked with brown and with traces of yellow; ventral side of tail more or less reddish. The specimen was taken alive, just at twilight; then it appeared to have a series of large, well-defined markings above and appeared yellow or white below. As it was necessary to preserve the specimen at once, the colors of the living animal were not observed by daylight.

Measurements of Lepidodactylus christiani Taylor.

| | mm. |
|------------------------------------|-----|
| Length, tail partially regenerated | 83 |
| Snout to vent | 43 |
| Hind leg | 15 |
| Foreleg | 12 |
| Width of head | 8.5 |
| Greatest body width | 11 |
| Greatest tail width | 8 |

Remarks.—This species is named for Capt. Ralph L. Christian, United States Army, who accompanied an expedition to Canlaon and assisted in making collections. The unique specimen of this species was found in a large mass of fern and other roots cut from its resting place in a tree about 8 meters from the ground. This mass was being searched for arboreal Typhlopidae common in such habitats in Mindanao. Although no species of *Typhlops* was found, this species and a new species of *Siaphos* were dis-

covered. The species belongs to that part of the genus which is distinguished by the separation of the rostral from the nostril. The recently described *Lepidodactylus naujanensis* Taylor is the most closely related species.

LEPIDODACTYLUS AUREOLINEATUS Taylor

Lepidodactylus aureolineatus TAYLOR, Philip. Journ. Sci. § D 10 (1915) 97.

Description of species.—(From the type, No. 1775, Bureau of Science collection; collected at Bunawan, Agusan Province, Mindanao, June, 1913, by E. H. Taylor.) Rostral rectangular, the upper edge a straight line without notch or suture; nostril moderate, surrounded by rostral, two supranasals, and a large postnasal, supranasals separated from their fellows by a large median scale touching the rostral, with a pair of smaller scales on each side; eleven upper labials, ten lower labials; two or three slightly enlarged scales posterior to postnasal; mental smaller and narrower than adjacent labials; anterior lower labials large, subequal; a number of enlarged chin scales nearly all anterior to a line drawn across jaw between fourth and fifth lower labials; granules on snout larger than those on back; those on occiput smaller than those on back; scales on belly cycloid, juxtaposed or subimbricate; a long series of preanal and femoral pores in a continuous series, angular medially, nineteen on each side; behind this series is a short angular series of preanal scales as large as, or larger than, the pore scales; behind this the scales gradually diminish in size to anus; legs well developed, overlapping when adpressed; foreleg brought forward reaches a very short distance in front of eye; digits very unequal in length, with short distal phalanx bearing a claw; distal phalanx and claw wanting on inner digits; digits only slightly wider at ends than at base, with a series of lamellæ on underside from tip to base, fifteen or sixteen under longest toe, ten under shortest; a rudiment of web distinctly evident, and a slight fold of skin along posterior aspect of hind leg; diameter of eye twice in length of snout; ear opening rather large, rather circular; ear and nostril equidistant from eye; tail subcylindrical, flattened below, covered above with granules arranged in regular transverse rows, eight or nine to each annulation; laterally a sharp, denticulate fringe, the annulations marked by a larger spinelike scale; scales below larger, imbricating, six or seven rows in each annulation.

Color in life.—Color changeable; when first taken the back was dark brown with a series of reddish green spots beginning on middle of back and continuing to end of tail, growing more dis-

tinct posteriorly; a narrow, bright golden yellow line from tip of snout through eye to near insertion of foreleg; tip of tongue black; belly powdered with brown. After being kept a few hours these colors changed markedly; the back became yellowish green, the spots very indistinct, and a few blackish dots appeared about the latter; the abdomen became greenish, and much of the brown disappeared; when first taken, the tail was marked with reddish brown spots; on the underside it was brick red, densely flecked with brown, with indications of narrow horizontal bars. The tail did not change in color with the balance of the body.

Measurements of Lepidodactylus aureolineatus Taylor.

| | mm. |
|-----------------|-----|
| Total length | 76 |
| Tail | 42 |
| Axilla to groin | 17 |
| Width of head | 7 |
| Length of head | 11 |
| Foreleg | 9 |
| Hind leg | 15 |

Variation.—The various specimens taken show but little variation; the upper labials vary between eleven and twelve, the lower between ten and eleven, the usual numbers being twelve upper and ten lower labials. The regenerated tail is very much flattened, with a much broader fringe, its sides parallel for some distance, and then tapers suddenly toward the tip. A young specimen taken on a branch floating in the river was light yellow-green, with no markings of any sort save the line through the eye.

Remarks.—From *L. lugubris* this species differs in the tail having the free, serrated, lateral fringe, and the larger series of preanal and femoral pores; from *L. labialis* in the number and arrangement of the pores (*L. labialis* having only nine preanal pores on each side) and in the shape of the tail; from *L. brevipes*, also in the number and arrangement of the pores and in the shape of the tail. It is not very easy to distinguish the species from *L. planicaudus* Stejneger, since a complete description of this is not at hand, and I have access to no specimen of the species. The digits of the present species do not appear to be wider in proportion to their length than do those of *L. lugubris*. From *L. divergens* and *L. woodfordi* it differs in the size and the shape of the tail; the head is longer in proportion to its width, and the number of preanal pores is larger. The species is arboreal, and most of the specimens were taken from the tops of felled

trees. More than ten specimens were obtained, but several were lost. It is known only from the type locality.

TABLE 7.—Measurements and scale counts of *Lepidodactylus aureolineatus* Taylor.

| No. | Locality. | Sex. | Length, snout to vent. | Tail. | Head. | |
|------------|------------------------|------|------------------------------|-------|---------|--------|
| | | | | | Length. | Width. |
| | | | mm. | mm. | mm. | mm. |
| 486 | Bunawan, Mindanao..... | ♂ | 35 | (a) | 11 | 7 |
| 484 | do..... | ♂ | 37 | (a) | 11 | 8 |
| 485 | do..... | ♂ | 41 | b 34 | 11 | 7.5 |
| 483 | do..... | ♀ | 26 | 29.5 | 8 | 5.1 |
| 1775 | do..... | ♂ | 34 | 42 | 11 | 7 |

| No. | Axilla to groin. | Foreleg. | Hind leg. | Upper labials. | Lower labials. | Preanal pores or pore scales. | Collection. |
|------------|---------------------|----------|-----------|-------------------|-------------------|--|--------------------|
| | mm. | mm. | mm. | | | | |
| 486 | 16 | 9.5 | 13 | 11-12 | 10 | 19-19 | E. H. Taylor. |
| 484 | 17 | 11 | 13.8 | 12-13 | 10-12 | 19-19 | Do. |
| 485 | 20.5 | 12 | 15.5 | 12 | 10-11 | 18-19 | Do. |
| 483 | 13.5 | 7 | 10 | 12 | 11 | 18-19 | Do. |
| 1775 | 17 | 9 | 15 | 11 | 10 | 19-19 | Bureau of Science. |

^a Missing.

^b Regenerated.

LEPIDODACTYLUS LABIALIS (Peters)

Gecko labialis PETERS, Mon. Berl. Ak. (1867) 14.

Lepidodactylus labialis BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 166;
BOETTGER, Ber. Senck. Nat. Ges. (1886) 96.

Description of species.—This species is very closely allied to *Lepidodactylus lugubris* Duméril and Bibron, but differs in having fourteen upper labials and fifteen lower labials, the pre-anal pores arranged in a doubly arched series, angular medially, nine on each side, and no femoral pores. Tail cylindrical with the scales larger than those on the body. A single specimen is known from Mindanao.

Remarks.—No complete description of this species is on record, and I doubt whether the species has been retaken. The type was collected in Mindanao by C. Semper.

Genus LUPEROSAURUS Gray

Luperosaurus GRAY, Cat. Liz. (1845) 163.

Digits strongly dilated, half webbed, with undivided, angularly curved lamellæ below; all but thumb and inner toe with a very

short, compressed, distal phalanx, with retractile claw; legs bordered with cutaneous lobes; upper and lower surfaces covered with juxtaposed granular scales; pupil vertical; males with pre-anal pores.

The three species of this genus are confined to the Philippine Islands.

Key to the species of Luperosaurus Gray.

*a*¹. No enlarged chin shields.

*b*¹. Upper labials, 16; lower labials, 14 or 15; (body with lateral fringe?); pores present; tail narrow, annulate, the lateral keel with a slight fringe formed by projecting elongate scales.

L. cumingii Gray (p. 86).

*b*². Upper labials, 14 or 15; lower labials, 14; preanal pores, 16; tail narrow, depressed, the annuli marked by spinelike scales.

L. macgregori Stejneger (p. 87).

*a*². Enlarged chin shields present; upper labials, 11; lower labials, 11; preanal and femoral pores, 31, in a continuous series; tail rather flattened, annulations marked by 2 spinelike lateral scales.

L. joloensis Taylor (p. 88).

In the generic description Boulenger* says: "Males with præ-anal pores," but he does not mention the number of scales or pores in the description of the type. The plate giving a figure of the species plainly shows the presence of a lateral fold or fringe. This is not mentioned in the description, as Stejneger points out.† *Luperosaurus macgregori* Stejneger appears to be rather closely related to *L. cumingii* save for this difference. No specimens of these very rare species are at hand for comparison. I refer *Luperosaurus compresicorpus* Taylor to a new genus, *Pseudogekko*. It was suggested in the original description that this might be necessary.‡

LUPEROSAURUS CUMINGII Gray

PLATE 4, FIG. 1

Luperosaurus cumingii GRAY, Cat. Liz. (1845) 163; BOULENGER, Cat. Liz. Brit. Mus. (1885) 181, pl. 15, fig. 2.

Description of type.—(From Boulenger.) "Head regularly oviform; snout longer than the distance from the eye to the ear-opening, about once and a half the diameter of the orbit; forehead concave; ear-opening very small, subcircular. Body and limbs moderate; digits short, not very unequal, half-webbed; the

* Cat. Liz. Brit. Mus. 1 (1885) 181.

† Proc. U. S. Nat. Mus. 33 (1908) 545.

‡ Philip. Journ. Sci. § D 10 (1915) 97.

limbs bordered on each side by a cutaneous fringe, that extending from the vent to the tarsus being much developed; an angular lobe of skin closes the vent in the female. Tail shorter than the body, convex superiorly, flat inferiorly, probably prehensile. Head, back, and limbs covered with extremely minute granules; rostral large, square; nostril pierced between the latter, the first labial, and three or four small nasals; sixteen upper and fourteen or fifteen lower labials; rostral trapezoid, not larger than the nearest labials; no chin-shields; throat minutely granulate; belly covered with small flat juxtaposed granules. Tail indistinctly annulate, covered with small flat granules, rather larger inferiorly, the lateral keel with a slight fringe formed by projecting elongate scales."

Color.—"Purplish-brown above, marbled with darker; lower surfaces whitish, belly with narrow transverse brown lines."

Measurements of Luperosaurus cumingii Gray.

| | mm. |
|------------------|-----|
| Total length | 129 |
| Head | 20 |
| Width of head | 17 |
| Body | 63 |
| Foreleg | 23 |
| Hind leg | 30 |
| Tail, reproduced | 46 |

Remarks.—The type and the cotype were taken by Cuming in 1836–1840, the exact locality now being unknown. No other specimen of this rare and interesting species has been collected.

LUPEROSAURUS MACGREGORI Stejneger

Luperosaurus macgregori STEJNEGER, Proc. U. S. Nat. Mus. 33 (1908) 545.

Description of species.—(From Stejneger.) "Eye nearer the ear than the tip of the snout, its diameter about two-thirds of its distance from the latter; forehead slightly concave; ear-opening small, obliquely elliptic; digits half webbed; a very narrow dermal fold on each side of the legs, slightly better developed along the posterior side of the femur, but not a trace of fold on sides of body or tail; tail not longer than body (without head), narrow, slightly depressed, not more flattened underneath than above; body and extremities above and below covered with minute granules, those on the underside of the tail slightly larger; rostral broad, rectangular, with a median triangular process above, in touch with a small median internasal between two wide

supranasals; nostril between rostral, first supralabial, one small post nasal and two supranasals, the anterior of which are very wide and nearly meeting behind the rostral; 15 upper (14 on right side) and 14 lower labials; mental small, not distinguishable by size or shape from the other labials; no chin-shields, but the throat granules increased gradually in size toward the labials; a transverse group of somewhat enlarged granules a short distance in front of the vent, the posterior row bearing an uninterrupted series of 16 pores; tail above slightly annulate, each annulus marked posteriorly on the side by a slightly enlarged spine-like scale."

"Color (in alcohol), above dull russet clouded with indistinct dusky markings which are more or less longitudinal; underside whitish, slightly washed with russet."

Measurements of Luperosaurus macgregori Stejneger.

| | mm. |
|-----------------------------|-----|
| Total length, tail broken | 50 |
| Snout to eye | 4.5 |
| Snout to ear | 10 |
| Snout to vent | 35 |
| Diameter of eye | 3 |
| Tail from vent, tail broken | 15 |
| Foreleg | 8 |
| Hind leg | 11 |

Remarks.—The type specimen and one cotype were taken on Calayan, Babuyan, by Richard C. McGregor, for whom this species has been named. No further collection seems to have been made in this remote locality.

LUPEROSAURUS JOLOENSIS Taylor

PLATE 2, FIG. 8

Luperosaurus joloensis TAYLOR, Philip. Journ. Sci. § D 13 (1918) 235.

Description of species.—(From the type, No. 1872, Bureau of Science collection; collected at Siet Lake, Jolo, September 22, 1917, by E. H. Taylor.) Snout squarish; rostral upright, longer than broad, with two slight depressions in upper part entering from near median internasal; nostril surrounded by a raised prominence consisting of rostral, first labial, a postnasal, and two supranasals; last three scales coequal; eleven upper labials, last two small, second and third larger than first; a row of slightly enlarged scales above upper labials, those immediately behind postnasal largest; mental almost triangular, differentiated from labials; a pair of hexagonal chin shields, followed by a single median scale; eleven lower labials, last three very

small; eight upper and eight lower labials below center of eye; two or three rows of scales bordering lower labials slightly enlarged; forehead concave; granules on snout larger than those on back or occiput; ear opening narrow, oblique; granules on side, and on part of head and neck intermixed with numerous spinelike scales; no lateral fold, but several enlarged scales arranged in a more or less regular row low on side; a fold of skin about legs, more prominent on posterior aspect of hind legs; scales on belly larger than on throat or back; a row of enlarged scales in the femoral and preanal regions, sixteen on each side, beginning on knee and meeting medially at a broad angle, some of the scales with perforations or depressions; behind this row, in front of anus, an angular row of much enlarged scales; anus not covered by an angular flap of skin; tail contained in distance from snout to vent one and one-half times; tail tapering gradually, rather flattened below, narrow, the annulations distinctly marked above; laterally two spinelike scales on each annulation pointing backward; scales on upper side larger than those on back, the annulations marked by a transverse row of scales slightly more prominent than the others; below, scales arranged in transverse rows, the annulations marked by a row of slightly larger scales; a single prominent scale below at base of

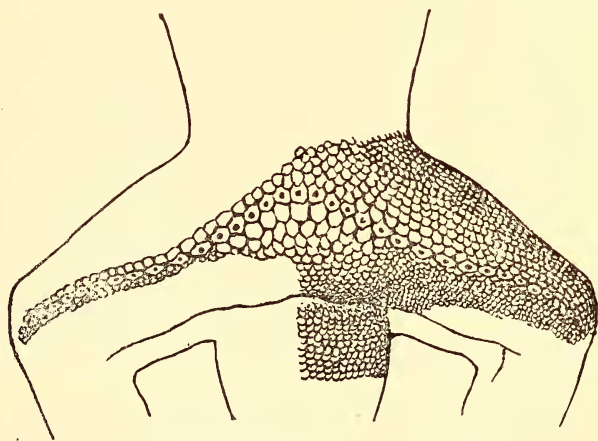


FIG. 9. *Luperosaurus joloensis* Taylor; from the cotype, from Jolo; preanal pores; about $\times 4$.

tail on either side; adpressed legs meet; digits a little more than half webbed; claws present on all save inner digits; lamellæ on outer extremities of digits divided, about six on longest toe, followed by a few undivided, scalelike lamellæ; diameter of eye less than its distance from nostril or auricular opening.

Color in life.—Above russet brown, with indistinct grayish markings on side of snout, occiput, sides of neck, and across back between hind legs; below yellowish, mixed with flecks of brown; tail indistinctly barred above; below, grayish brown.

Measurements of Luperosaurus joloensis Taylor.

| | mm. |
|-----------------|------|
| Total length | 59 |
| Snout to vent | 36 |
| Tail | 23 |
| Width of head | 5.5 |
| Length of head | 10 |
| Axilla to groin | 17 |
| Foreleg | 10.5 |
| Hind leg | 14.7 |

Variation.—A second specimen captured in the same immediate locality is a male, and consequently differs from the type (which is an adult female containing undeveloped eggs) in the presence of distinct femoral and preanal pores. There are thirty pores in a continuous series from knee to knee, forming a distinct arch in the preanal region. The tail is missing. The color is brown with a wide occipital spot of gray and black mixed, and five irregular bands of gray and black intermixed across the back; length from snout to vent, 27 millimeters.

Remarks.—This species differs much from other Philippine species of the genus. The presence of chin shields, spinelike scales on side of neck and head, the much lower number of labials, and the large number and the arrangement of the femoral and preanal pores are all distinctive characters.

These two specimens were taken at Siet Lake, Jolo,* September 22, 1917. The female, which had evidently been running on the bole of a large *dapdap* tree, first made its presence known by jumping on my shoulder and escaping to the ground where it was later captured. The male was taken at the foot of the same tree in a pile of rocks.

Genus **GEKKO** Laurenti

Gekko (part.) LAURENTI, Syn. Rept. (1768) 43, 44; MERREM, Tent. Syst. Amph. (1820) 39.

Platydictylus (part.) CUVIER, Règ. Anim. 2 (1817) 45.

Gecko DAUDIN, Hist. Nat. Rept. 4 (1802) 105; OPPEL, Rept. Prodr. (1811) 23; GRAY, Ann. Phil. II 10 (1825) 199; Cat. Liz. (1845) 164; GÜNTHER, Rept. Brit. India (1864) 101.

Scelotretus FITZINGER, Syst. Rept. (1843) 101.

* Siet Lake is a small crater lake situated in the central northern part of Jolo, only a few hundred meters from the coast. A small Constabulary Post is maintained there. The post is situated on the edge of the crater on a side which juts into the lake, forming a small promontory. It was in this exact locality that the types were collected.

Digits strongly dilated, free, or webbed at base, with undivided lamellæ below; all but thumb and inner toe with a very short compressed distal phalanx with retractile claw. Body covered with small irregular scales and tubercles; belly with imbricated scales. Pupil vertical. Preanal or femoral pores present in males, and pores sometimes present in females.*

It will be seen from the synonymy that the genus defined by Laurenti is spelled *Gekko* and not *Gecko*. *Gecko rhacophorus*, which Boulenger has described from Borneo, undoubtedly belongs in a separate genus. The broad, scaled, lateral expansion and the fringed tail clearly separate it from *Gekko*.

There are three species of *Gekko* known in the Philippines and they may be easily differentiated by the following key:

Key to the Philippine species of Gekko Laurenti.

*a*¹. Rostral not entering nostril; body with 12 rows of tubercles; preanal pores, 11 to 15; grayish blue, spotted with orange red.

G. gecko (Linnaeus) (p. 94).

*a*². Rostral entering nostril.

*b*¹. Body covered with numerous spiny tubercles; preanal and femoral pores, 32 to 40, in a continuous series; light gray to brown with a median series of paired dark spots.

G. monarchus (Duméril and Bibron) (p. 91).

*b*². Body covered with fewer, rather flattened tubercles; preanal and femoral pores continuous, 55 to 64; markings not well defined.

G. mindorensis Taylor (p. 98).

GEKKO MONARCHUS (Duméril and Bibron)

PLATE 1, FIG. 1

Platydictylus monarchus DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 355; CANTOR, Cat. Mal. Rept. (1847) 19.

Platydictylus (Scelotretus) monarchus FITZINGER, Syst. Rept. (1843) 101.

Gecko monarchus GRAY, Cat. Liz. (1845) 161; GIRARD, U. S. Explor. Exp., Herp. (1858) 292; GÜNTHER, Rept. Brit. India (1864) 103; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 187; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 54.

Description of species.—From No. 876, E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, August, 1912, by E. H. Taylor.) Head large, oviform, flattened, with a broad distinct groove beginning slightly posterior to posterior level of eyes, and continuing forward to some distance on snout, where it narrows greatly and continues to end of snout; snout long,

* The preanal pores are smaller in the female than in the male, and in some cases appear to consist of merely a perforation in the preanal scales.

more than twice diameter of eye; eye equidistant between ear and nostril; ear much nearer foreleg than anterior edge of eye; rostral not, or but scarcely, twice as broad as high, depressed medially, notched above with a small "interrostral" scale partially inserted in notch; nostril surrounded by rostral, first labial, one supranasal, and two postnasals; the supranasals separated by a small internasal, both making broad sutures with rostral; lower postnasal largest; eleven or twelve upper labials, the last three quite small; mental broader than long, not as broad as rostral, bordered behind by a pair of chin shields, more than three times as long as wide; these bordered laterally by the large first labial and a pair of enlarged scales, behind by several scales, also somewhat enlarged; eleven lower labials; scales on snout enlarged irregularly; body covered above with minute granules, intermixed

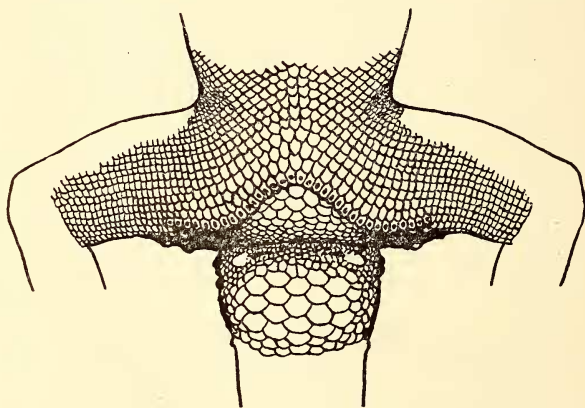


FIG. 10. *Gekko monarchus* (Duméril and Bibron); preanal pores; $\times 2$.

with large conical tubercles, arranged in about twenty irregular longitudinal rows; tubercles largest laterally, and present on neck; small tubercles on temples and occiput; an especially prominent granule on neck; a distinct fold of skin borders belly laterally from axilla to groin; tubercles present on legs; on tail tubercles are arranged in transverse rows, marking annulations, six to eight in each row on first half of tail; granules on throat small; belly scales cycloid, imbricate, arranged in about forty-two longitudinal rows; a series of thirty-four preanal pores arranged in a continuous series slightly angular medially, with a slight curved arch on outer ends; two or three rows of scales anterior to these enlarged ones, gradually diminishing in size; two or three enlarged tubercles at base of tail on either side; tail cylindrical,

slightly depressed below, with a median series of widened plates; on regenerated part of tail the transverse plates are narrower and very much longer; all digits well developed, dilated, no trace of web present; inner digit without terminal phalanx or claw; ten undivided curved lamellæ under inner toe, twelve or thirteen under fourth toe; ear opening oval, oblique, its greatest diameter about one-third orbit.

Color in life.—Above light grayish brown, with nine large, paired, median, black-brown spots from occiput to base of tail; scattered spots on sides of body and top and sides of head and legs; below immaculate brownish white; many tubercles above are yellowish; yellowish spots on labials; tail barred with brown above.

Measurements of Gekko monarchus (Duméril and Bibron).

| | mm. |
|------------------|-----|
| Total length | 177 |
| Snout to foreleg | 32 |
| Snout to vent | 85 |
| Axilla to groin | 38 |
| Width of head | 18 |
| Length of head | 28 |
| Tail | 92 |
| Foreleg | 30 |
| Hind leg | 40 |

Variation.—This species, which is widely distributed over the Malay Archipelago, Ceylon, and Malay Peninsula, shows comparatively little variation. The pores vary from thirty-two to forty, according to Boulenger and de Rooij. Both of these authors mention a rudiment of web which seems to be absent in the Philippine specimens.

Three other specimens taken in houses, in the same locality as was the one described, were young females; the markings are very distinct. There is a spectaclelike marking on the occiput; the tail is barred with broad brown spots, about thirteen to the tip. A young specimen from Negros has the color pattern dimmed and the median spots are confluent, the throat is peppered with brown, and the underside of the tail is brownish. A specimen from Palawan (No. 114, Bureau of Science collection) shows the typical markings. It is light, and the light spots on the labials are very distinct.

The two specimens from Bongao are different in markings and coloration. The entire body above is dark blackish gray with the darker median spots indistinct and usually confluent; the yellow tubercles form rather distinct, irregular, transverse lines

on back; the underside of the body is more or less peppered with brown; the tail is dark below. The tubercles on these specimens, both of which are females, are much less prominent.

Remarks.—This species attains a length of at least 205 millimeters. It is domestic in habit and is also found under the loose bark of trees.

The specimens of this species apparently are most numerous in the southern part of the Philippine Archipelago. The species is reported from Dinagat by Günther and from northwestern Mindanao by Boulenger. I collected four specimens at Bunawan, Agusan, Mindanao; two in Bongao, near Tawitawi, Sulu Archipelago; and one in Negros. In all of these localities the species seemed rare.

Günther says:

This species attains to a length of 7 inches; the newly hatched animal is $2\frac{1}{2}$ inches long. * * * Cantor says that this species possesses the power of changing its ground-color in a greater degree than any other gecko. It is very numerous at Pinang, swarming at night in rooms occasionally giving out a sound resembling the monosyllable "tok" repeated six or eight times with increasing celerity. They are pugnacious among themselves, two or more sometimes fighting for an insect.

In Mindoro (possibly also in Luzon) this species seems to be replaced by a closely related form having a very much larger number of pores. I have seen no specimen from Luzon, but Stejneger * reports one from Calayan Island, Babuyan, north of Luzon, collected by Richard C. McGregor.

The species is widely distributed in the East Indian Archipelago. It is known from Celebes, Borneo, Java, Sumatra, Malay Peninsula, and even Ceylon.

GEKKO GECKO (Linnæus)

Lacerta gecko LINNÆUS, Syst. Nat. ed. 10, 1 (1758) 205; ed. 12, 1 (1766) 365.

Gekko verticillatus LAURENTI, Syn. Rept. (1768) 44.

Gecko teres LAURENTI, Syn. Rept. (1768) 44.

Stellio gecko SCHNEIDER, Hist. Amph. 2 (1801) 12.

Gecko guttatus DAUDIN, Hist. Nat. Rept. 4 (1802) 122, pl. 49; CUVIER, Règ. Anim. 2 (1817) 46; ed. 2, 2 (1829) 53; GÜNTHER, Rept. Brit. India (1864) 102.

Gecko annulatus KÜHL, Beitr. Zool. Vergl. Anat. (1820) 132.

Gecko verus MERREM, Tent. Syst. Amph. (1820) 42; GRAY, Zool. Journ. 3 (1827) 223; Cat. Liz. (1845) 160; GÜNTHER, Proc. Zool. Soc. London (1879) 76.

* Proc. U. S. Nat. Mus. 33 (1908) 545.

Platydyctylus guttatus DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 321, 328, pl. 28, fig. 4; GUÉRIN, Icon. Règ. Anim. (1834) pl. 13; PETERS, Preuss. Exped. O. Asien, Zool. Teil 1 (1876) 374.

Gekko reevesii GRAY, Cat. Liz. (1845) 160; FITZINGER, Syst. Rept. (1843) 101.

Gekko indicus GIRARD, U. S. Expl. Exped., Herp. (1858) 290, pl. 16, figs. 9-16.

Gekko verticillatus BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 183; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 56.

Gekko gekko BARBOUR, Mem. Mus. Comp. Zool. Harv. Coll. 44 (1912) 82.

Description of species.—(From No. R1666, E. H. Taylor collection, collected in Negros in 1915 by E. H. Taylor.) Head large; a broad, very shallow depression on snout; rostral one and one-half times as wide as high, with a small cleft entering from above; rostral separated from nostril by two prenasal scales, the upper very much the larger (lower scale only rarely present) and separated from its fellow by a single scale; nostril surrounded by first labial, two postnasals, a supranasal, and two prenasals; supranasals separated from each other by one or two scales; thirteen or fourteen upper labials, twelve lower labials, each with a small, rounded, distinct, median tubercle or keel; four enlarged chin shields on either side of jaw bordering lower labials; the two in contact with mental and with each other are much longer than broad, about as long as mental, which is wider than adjacent labials but not so long; a single pentagonal scale following the pair of median chin shields; head covered above with conical tubercles, those above labials rather elongate, keeled; body covered above with rather irregular, flat, juxtaposed granules or scales with twelve longitudinal rows of much-enlarged, flat or rounded tubercles, those on neck and above ear distinctly conical; eight rows of tubercles continued some distance on tail, keeled; tubercles on legs flattened; scales behind ear smallest on body, imbricating; scales on throat rounding, juxtaposed, larger on angle of jaws, smaller than belly scales; latter in thirty-two longitudinal rows, larger than scales on back, imbricating; annulations on tail distinctly marked, each with five transverse rows of scales and one row of tubercles; the first transverse row of scales on each annulation larger and more regular than other scales; below, scales larger than above, the median paired series largest; three or two rows to each annulation; tubercles not continued to tip; a slight skin fold from axilla to groin; legs large, digits free, all save inner with compressed, clawed, free, distal phalanx; fifteen broad, curved, undivided lamellæ under inner

toe, eighteen under fourth toe and an equal number under fourth finger; digits wider at tips than at base; preanal pores in a short angular series, fifteen altogether, the median "keystone" scale triangular; five rows of scales in front of anus slightly enlarged; three tubercles on each side of base of tail; eye slightly nearer ear than end of snout; orbital diameter contained about one and one-half times in length of snout; width of head double the length of snout to orbit.

Color in life.—Above gray to ultramarine with numerous bright orange spots covering head, back, sides, and tail; below bluish gray with dimmer orange spots.

Measurements of Gekko gekko (Linnæus).

| | mm. |
|------------------|-----|
| Total length | 295 |
| Snout to vent | 145 |
| Tail | 150 |
| Snout to orbit | 18 |
| Snout to foreleg | 58 |
| Axilla to groin | 70 |
| Width of head | 35 |
| Length of head | 46 |
| Width of body | 30 |
| Foreleg | 47 |
| Hind leg | 64 |

Variation.—This widely distributed species shows considerable variation. Boulenger * gives the range of preanal pores as thirteen to twenty-four, which is larger than was found in the sixty-six specimens from various Philippine localities studied. In these the pores ranged from twelve to fourteen, save in three specimens, two of which had fifteen, and one seventeen. The presence of pores in the females has not been recorded, at least in recent years. Here the perforated preanal scales are somewhat fewer than in the males, averaging eleven or twelve; in a single female (No. 1610, Palawan, Bureau of Science collection) all the pores were absent save one. None of the other scales showed depressions.

The arrangement of scales about the nostril varies considerably. There are three arrangements that are common, namely: (a) the "prenasal" scales are in contact medially behind the rostral and in contact with the first labial below; (b) the prenasals are separated by a single large scale which also separates the supranasals; (c) prenasals are separated by a very small scale

* Loc. cit.

followed by a large scale. These variations are about equally divided among the specimens examined; a few specimens have a second prenasal separating the labial from the large prenasal.

In medium-sized specimens there are usually light blue bands, formed by a series of spots, across the body, sometimes continuing on the tail. These are not very distinct, as the blue is not much differentiated from the ground color; young specimens usually are dark, with dirty white spots, and the tail is banded with black and white.

Remarks.—This large gecko is one of the best-known members of the Philippine saurian fauna. It is found everywhere in houses, and its loud call usually makes its presence known. The call is very characteristic and sounds something between the syllables *tehuck ó* and *chuck kú*, harshly and slowly pronounced several times. This is preceded by several short “chucks” repeated rather rapidly, and usually in a much lower tone. The call on still nights may be heard for a distance of several hundred meters.

The females lay two eggs, which usually are glued to some perpendicular object. They are flat on the bottom, rounded above, and fastened to each other. It is almost impossible to remove them without breaking them. As a rule several females lay eggs in the same place, and it is usual to find together eight or ten sets of eggs in various stages of incubation, sometimes even superimposed. The same locations, if undisturbed, are used year after year.

This species is regarded as poisonous by a number of Philippine peoples, and by others not. The animal is capable of inflicting rather a painful bite, for once it takes hold of an object it will retain its grip with bulldog tenacity, and its powerful jaws must be pried open or much effort made before the object can be released. This gecko is more timid than are the smaller house geckos. Several specimens that were kept in captivity would turn and fight when slapped and lunge toward an outstretched hand, but they made no effort to escape.

It is found in all the larger Philippine islands and probably in most of the smaller ones. I have collected specimens in Negros, Mindanao, Jolo, Luzon, Mindoro, Cebu, Palawan, Lubang, and Panay. Its presence is known in many other islands. It is known also from India, China, French Indo-China, Sumatra, Java, Borneo, and Celebes.

GEKKO MINDORENSIS Taylor

Gekko mindorensis TAYLOR, Philip. Journ. Sci. 14 (1919) 115.

Type.—No. 499, E. H. Taylor collection; collected at Pocanil Point, Mindoro, May 4, 1916, by E. H. Taylor.

Description of type.—Head moderately large, rather oviform; snout somewhat longer from eye than distance of eye to auricular opening; latter at least one-half diameter of eye, oval, distinctly oblique; rostral large, wider than deep, with a suture above, medially; nostril large, obliquely oval, surrounded by ros-

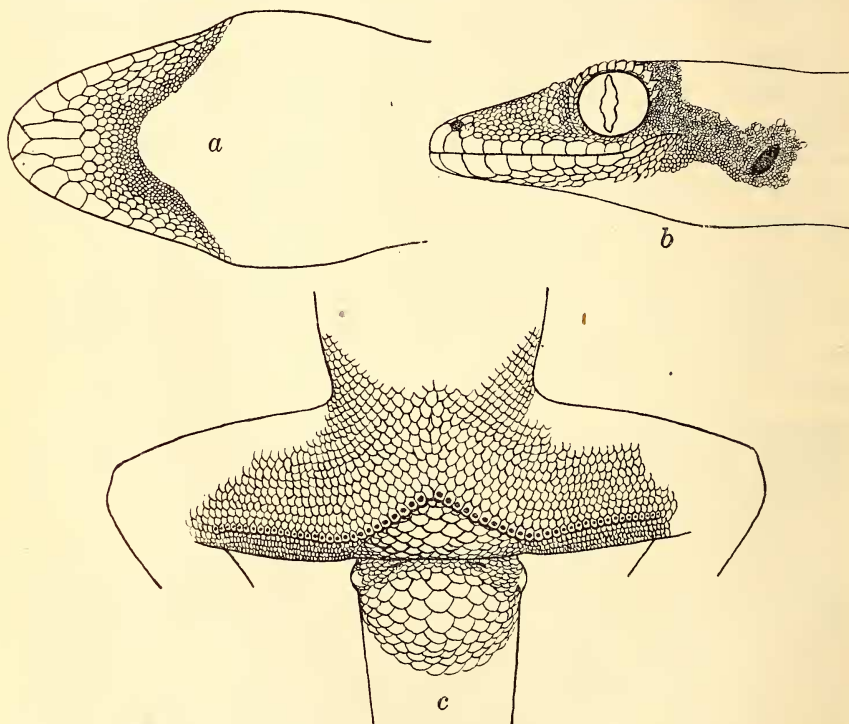


FIG. 11. *Gekko mindorensis* Taylor; from the type; a, chin; b, head, lateral view; c, preanal pores; $\times 2$.

tral, first labial, two subequal supranasals, and a postnasal; rostral forming the longest side of nostril; a single scale inserted between the two anterior supranasals; twelve upper labials, ten lower; the line of the mouth makes a sharp angle upward immediately below eye; loreal region covered with rather enlarged granules, largest immediately in front of eye; a row of enlarged granules bordering upper labials above; interorbital region and medial area on snout depressed, covered with much smaller granular scales; occipital region covered with minute granules, interspersed with indistinct larger ones; mental trian-

gular, followed by two elongate chin shields nearly three times as long as wide; a few enlarged pentagonal scales behind and at sides of chin shields; throat covered with equal-sized granules, larger than those on dorsal surface. Body rather slender, covered above with minute granules, intermixed with numerous rounding granules; an indistinct lateral fold; about thirty longitudinal rows of scales between the folds cross belly; preanal and femoral pores continuous, twenty-seven or twenty-eight on each side, slightly separated medially, a total of fifty-five pores; tail regenerated wholly, above covered with fine granules, with no traces of annulations; below with irregular, large, broad scales; two enlarged tubercles at base of tail; legs moderate, digits not greatly dilated, about sixteen lamellæ under longest toe; no rudiment of web evident.

Color in life.—Above almost uniform olive brown, with very little variation delineating the lighter and darker areas. No markings evident; below yellowish white.

Measurements of Gekko mindorensis Taylor.

| | mm. |
|----------------------|------|
| Total length | 162 |
| Tail, regenerated | 80 |
| Snout to foreleg | 34.5 |
| Snout to vent | 82 |
| Snout to ear opening | 22 |
| Foreleg | 30 |
| Hind leg | 40 |

Variation.—Eight other specimens, all young, taken by myself about Lake Naujan, Mindoro, have been studied. They are darker than the type, with blackish stripes across the back and on the tail. Two males in the lot have sixty-two and sixty-four pores, respectively.

Remarks.—This species is related to *Gekko monarchus*, from which it differs in the following points. The measurements of two male specimens are compared.

Comparative measurements of Gekko mindorensis and G. monarchus.

| | <i>G. mindorensis.</i> mm. | <i>G. monarchus.</i> mm. |
|-------------------------------|-------------------------------|-----------------------------|
| Snout to vent | 82 | 85 |
| Foreleg | 26 | 29 |
| Hind leg | 35 | 40 |
| Width of body | 16 | 18 |
| Width of head | 18 | 20 |
| Diameter of eye | 6.5 | 5 |
| Diameter of auricular opening | 3.3 | 2 |
| Interorbital measurement | 6.75 | 8 |
| Preanal and femoral pores | 55 | 33 |
| Scale rows across belly | 30 | 45 |

The ear opening of *Gekko mindorensis* is larger, equaling half the eye. The eye itself is much larger than in *G. monarchus*; the interorbital distance is less; there are more preanal and femoral pores; the number of scale rows across the belly is about fifteen less; the tubercles are fewer and much less prominent; and the very characteristic markings of *Gekko monarchus* apparently are wanting. The type specimen was captured with the assistance of Mr. Clark Burks, of Sumagui, Mindoro; two eggs were found at the same time.

Oshima * has described *Gecko kikuchii* from Formosa, which seems to vary from *Gekko monarchus* much in the same way as does the present species. Although no specimen of Oshima's species is at hand for comparison, the following differences are evident; *G. mindorensis* has many more femoral pores, 55 to 64, while 48 are recorded in *G. kikuchii*. The legs are longer in the present species, and the basal web on the feet is wanting in both sexes.

Genus PTYCHOZOOM Kuhl

- Ptychozoon* KÜHL, Isis (1822) 475; WAGLER, Syst. Amph. (1830) 141; WIEGMANN, Herp. Mex. 1 (1834) 20; FITZINGER, Syst. Rept. (1843) 100; GRAY, Cat. Liz. (1845) 164; GÜNTHER, Rept. Brit. India (1864) 105; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 189.
Pteropleura GRAY, Phil. Mag. II 3 (1827) 56; FITZINGER, Syst. Rept. (1843) 101.
Platydictylus, part., DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 290.
Ptychozoom. BOETTGER, Kat. Rept. Mus. Senckenberg. 1 (1893) 35.

Digits strongly dilated, entirely webbed, with undivided lamellæ below; distal phalanx of toes compressed, curved, with retractile claw rising a little in front of the end of digital expansion, wanting on inner digits. A broadened cutaneous fringe on either side of head, legs, and body. Body above with small granules, tubercles present or absent; below with imbricating scales; lateral membranes covered above with rather large scales, scaleless below. Pupil vertical. Males with preanal, or preanal and femoral pores. Tail bordered with lateral fringelike lobes.

East Indian Archipelago, Malay Peninsula, Formosa, and the Philippines.

Only a single species is known in the Philippines, the recently discovered *Ptychozoon intermedia*, which seems to stand between the other two known species, *P. kuhli* and *P. horsfieldii*.

* Philip. Journ. Sci. § D 7 (1912) 241.

PTYCHOZOON INTERMEDIA Taylor

PLATE 5

Ptychozoon intermedia TAYLOR, Philip. Journ. Sci. § D 10 (1915) 94.

Description of species.—(From No. 1776, Bureau of Science collection; collected at Bunawan, Agusan Province, Mindanao, July 12, 1912, by E. H. Taylor.) Rostral large, rectangular, with a triangular depression in upper edge; nostril surrounded by rostral, first labial, two postnasals, and a rather large supranasal; latter distinctly triangular, forming a suture with its mate behind rostral; a large scale lies partly between supranasals; a small roundish scale on either side of this, directly behind supranasals, touching superior postnasals, eleven upper labials, ten lower; mental much smaller than rostral or any of first five lower labials, followed by two postmental chin shields; latter elongate, widest in the middle; a second smaller pair borders these laterally on each side of the chin shields; a row of scales gradually diminishing in size bordering labials; scales on snout and supraocular regions of head at least twice as large as those on occiput; latter area with scattered small tubercles; a group of enlarged scales directly in front of eye; back with uniform granular scales intermixed with flat roundish tubercles, six or seven irregular rows on each side; scales on belly much larger than dorsal scales, or those on neck; on each side of head below auricular opening is a dermal flap, widest in front of auricular opening, which continues from near angle of mouth to some distance on neck; a similar flap on foreleg borders the leg entirely; dermal flap on hind leg is wanting from groin to knee; on each side of body a wide dermal flap, or parachute, extends from foreleg, where it joins flap of foreleg, and continues to groin; tail with a lateral series of small rounded lobes decreasing in size toward tip and directed backward "sawtooth" fashion; tail with a flap on tip, which is scarcely wider than nearest lobes; each segment of tail with a number of enlarged scales; above on first half of tail there are from six to eight on each segment, on last half the number is reduced; digits almost entirely webbed; digits, except inner, with claws, and below with undivided lamellæ which cover outer half of digit, about ten under longest toe; distal phalanx on inner finger and inner toe replaced by a large flattened scale; a series of ten differentiated preanal scales arranged in a curved line; widely separated from these is a series of differentiated

femoral scales, thirteen or fourteen in number, which probably represent the number of preanal and femoral pores in the male; a large scale on each side of tail behind anus; diameter of eye equals its distance from ear, but is less than distance from nostril; a depression behind nostril.

Color in life.—A soft olive gray above with touches of bluish and brown; body traversed by several wavy lines of dark brown. Head more or less flecked with brown; a broad brown band from eye to shoulder; tail marbled variously with brown; legs indistinctly barred with reddish brown bands; below cream with large indistinct darker spots under tail.

Measurements of Ptychozoon intermedia Taylor.

| | mm. |
|-----------------------|-----|
| Total length | 189 |
| Snout to vent | 92 |
| Length of head | 24 |
| Depth of head | 10 |
| Width of head | 21 |
| Axilla to groin | 47 |
| Foreleg | 30 |
| Hind leg | 43 |
| Width of lateral flap | 8.5 |
| Length of femur | 15 |
| Greatest body width | 20 |

Remarks.—This species seems to be a form rather intermediate between the two known species of the genus. From *Ptychozoon kuhli* it differs in the absence of the wide flap at the extremity of the tail, the very different character of the lateral lobes on the tail, and the much larger number of tubercles on the body; perhaps also in the presence of femoral pores. From *P. horsfieldii* it differs in having the body granules intermixed with numerous flat tubercles and broad transverse plates below the tail except on the outer tip. A comparison of the descriptions will reveal other differences.

Only the type specimen was found; it was captured about ten o'clock in the morning on the buttress of a large *naga* tree, near the small Manobo village of Bunawan on Simulao River. When disturbed the animal jumped to the earth amid a mass of leaves and bark and was practically indistinguishable from its surroundings.

Stejneger * expresses a doubt that Pryer's † specimen of *P. homalocephalum* came from the Riu Kiu Islands. He has exam-

* Bull. U. S. Nat. Mus. 58 (1907) 172.

† Boulenger, Proc. Zool. Soc. London (1887) 146.

ined the specimen and states that he regards it as identical with Gray's *P. horsfieldii*.*

The finding of this rare Mindanao species extends the known range of the genus. It was unknown to the Manobos; undoubtedly, its striking shape would have attracted their notice, were it at all common. Repeated trips were made to the locality in the hope of finding other specimens. Very probably the usual habitat of the species is in tall forest trees.

Genus PSEUDOGEEKKO novum

Digits entirely dilated with infradigital lamellæ extending to base, those on tip divided;† digits except inner with sessile retractile claw; a slight web between digits; no lateral skin fold; no enlarged chin shields; pupil vertical. Body compressed, with a narrow abdominal region; preanal pores (probably) present in males in a single row.

Type of the genus, *Luperosaurus compressicorpus* Taylor.

This genus seems to have its closest relationship with *Thecadactylus* as regards the structure of the digits. The elongation of the body and the structure and arrangement of the lamellæ warrant referring this species to a new genus.

PSEUDOGEEKKO COMPRESSICORPUS (Taylor)

Luperosaurus compressicorpus TAYLOR, Philip. Journ. Sci. § D 10 (1915) 96.

Description of species.—(From No. 1781, Bureau of Science collection; collected at Limay, Bataan, Luzon; collector unknown.) Body elongate, compressed laterally, with a narrow abdominal region; rostral large, nearly twice as wide as high, entering nostril; a slight suture entering medially from above, where there is a small notch in the scale; rostral bordered behind by two supranasals and five smaller scales between them; dorsal scales granular, those on snout largest; nineteen or twenty upper labials, angle of mouth bordered by small undifferentiated scales; first row of scales above upper labials enlarged somewhat; lower labials sixteen; mental smaller than adjoining labials; first few rows of scales bordering lower labials slightly enlarged, gradually diminishing in size away from labials; granules on neck extremely minute; granules on lower jaw below ear enlarged slightly; nostril small; eye large, its diameter one-half its distance from end of snout; auricular opening very small, its distance from eye less than the dis-

* Gray, Philos. Mag. II 2 (1827) 56.

† The statement, "digits with undivided lamella," in the original description is incorrect.

tance from eye to nostril; mouth extends well behind eye, forming an angle directly below eye; scales on body small, granular, subequal in size; scales on abdomen larger, cycloid, juxtaposed, and irregular, arranged in more or less regular transverse rows, sixteen to eighteen across abdomen; an angular row of fourteen differentiated preanal scales, probably representing the number of preanal pores in the male, the scales having depressions in them; angular rows of scales behind this row, diminishing in size toward anus; distal phalanx of digits very short with a retractile claw on each save thumb and inner toe; fifteen or sixteen lamellæ under longest toe; those on point of toes divided or semidivided; a small web at base of digits more noticeable on hind feet; digits about same width along entire length, slightly tapering at point; no web present on sides of

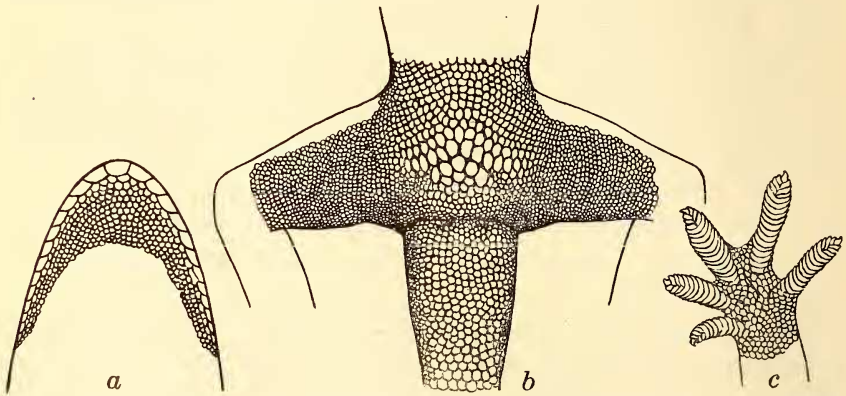


FIG. 12. *Pseudogekko compressicarpus* (Taylor); a, chin; b, preanal region; c, undersurface of foot; $\times 3$.

body or on legs; tail cylindrical, slightly flattened, no fringe on sides, annulations not indicated; tail probably prehensile.

Color in life.—Above light cinnamon brown, darker on arms and legs; below immaculate yellowish white; tail with a slight peppering of brown on undersurface. No markings in evidence.

Measurements of Pseudogekko compressicarpus (Taylor).

| | mm. |
|------------------------|-----|
| Total length | 110 |
| Snout to vent | 62 |
| Width of head | 9 |
| Greatest width of body | 7.5 |
| Axilla to groin | 36 |
| Foreleg | 15 |
| Hind leg | 23 |

Variation.—In April, 1917, I found two eggs belonging to what was apparently an unknown species. They were accidentally broken, and were found to contain almost fully developed embryos of *Pseudogekko compressicorpus*. These differ slightly from the type. The small scales about the angle of the mouth are slightly more differentiated, and might be counted as labials, which would make the number of labials twenty-five; there are three small nasal scales above and behind the nostril. There is no evidence of a depression behind the nostril, and the arrangement of the preanal scales is similar; one specimen has a series of small pits in the scales; in the other they are smooth. The embryos measure 43 millimeters in length; snout to vent, 22 millimeters. In color they are light gray.

Remarks.—Only these specimens are known. The type locality is Limay, Bataan Province, Luzon. The eggs were found in the topmost branch of a tree which had just been felled. They were attached to the underside of a leaf and were flattened on two sides, where they had been attached to the leaf and to each other; they were broken before measurements of the eggs could be taken. Apparently this is a very rare species, or its habits are such as to prevent its being found easily.

AGAMIDÆ

Agamidæ GRAY, Phil. Mag. II 2 (1827); Cat. Liz. (1845) 234;
BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 250.

Skull with bony postorbital and postfronto-squamosal arches, the first named formed by the frontal and the jugal, the latter by the postfrontal and the squamosal; supratemporal fossa not roofed over; premaxillary single; nasals distinct; parietal single; an interorbital septum; a columella cranii. Acrodont dentition, usually with molars, canines, and incisors. No teeth in palate. No dermal ossifications on head or body.

Tongue short or moderate, thick, not or but slightly nicked anteriorly, villose. Eye small, pupil round; eyelids well developed. Ear distinct or hidden. Scales imbricate or juxtaposed, scales on head quite irregular. Limbs well developed, the hind limbs usually very much longer than front; tail usually very long, not fragile; femoral and preanal pores are absent in the largest part of the genera. It is a remarkable fact that they are found in all Australian genera save one. Arboreal Agamidæ have the body compressed, and terrestrial forms flattened. (After Boulenger.)

Much has been written regarding the parallelism which occurs between this family and the Iguanidæ, which are confined to the New World.

Cope says:*

No genus of Agamidæ is found in America, where the Iguanidæ represent them. The two families present some interesting parallels, which show the effects of identical causes in producing similar effects on the organism. These parallels are seen in the depressed form of the terrestrial forms in both families and the relatively compressed form of the arboreal types. In both families the former have representatives with horny processes on the head and on the scales of the body; and in both are types with horny spines on the tail. Among arboreal forms we find genera of both families with series of horny processes forming a median dorsal crest, and in others a prolongation of the spines of the dorsal and caudal vertebræ, producing a like result.

In many cases the similarity is so striking that specimens from the two families might easily be referred to the same genus without examination of skeletal and dental characters.

The application of the name "iguana" to certain Agamidæ which occur in the Philippines is incorrect, as the Iguanidæ are confined to North, Central, and South America, and the West Indies. The Agamidæ are found in Australia, the East Indian Archipelago, Asia, Africa, and Europe. They are unknown in Madagascar and New Zealand.

There are only four genera of this family known in the Philippines.

Key to the Philippine genera of the Agamidæ.

a¹. Ribs much prolonged, supporting a winglike lateral dermal expansion which is folded close to body when not flying.. *Draco* Linnæus (p. 107).

a². No winglike expansion.

b¹. No femoral pores.

c¹. A strong fold on throat; usually a crest on neck or body.

Gonyocephalus Kaup (p. 130).

c². No fold or only a slight fold on neck; gular pouch more or less developed; tail extremely long, dorsal scales nearly equal.

Calotes Cuvier (p. 136).

b². Femoral pores present; toes lobate; a fan on tail.

Hydrosaurus Kaup (p. 140).

The food of these genera varies; the first three are insectivorous while the last is, almost if not wholly, herbivorous. All lay eggs, those of *Calotes* being spindle-shaped. The eggs of *Hydrosaurus* are somewhat oval to round and are deposited in sand or loose earth along streams and rivers.

The genus *Calotes* is noted for the ability of certain of its species to make rapid color changes; these changes take place in some species, especially *Calotes marmoratus* and *C. cristatellus*, with startling rapidity.

* Report U. S. Nat. Mus. for 1898 (1900) 219.

Genus DRACO Linnæus

Draco LINNÆUS, Syst. Nat. 1 (1758) 358; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 253.

Dracunculus WIEGMANN, Herp. Mex. (1834) 14.

Rhacodracon FITZINGER, Neue Class. Rept. (1826) 50.

Pterosaurus FITZINGER, Neue Class. Rept. (1826) 51.

Pteropterus FITZINGER, Neue Class. Rept. (1826) 51.

Dracontoidis FITZINGER, Neue Class. Rept. (1826) 51.

Dracocella GRAY, Cat. Liz. (1845) 234.

Body depressed, elongate, with long slender tail. Large lateral winglike membranes, supported by extensively elongated ribs, folding down like a fan. The male has a gular appendage and small skin flaps on each side of head; the gular appendage is largely wanting in the females. Tympanum distinct or covered. No preanal or femoral pores.

The Philippines are rich in species of this genus, eleven being recognized. Many of the Philippine peoples believe they are deadly poisonous, which of course is not the case. They are known under various native names; such as, *alap-á-pan* (Bicol), *tabili-pághan* (Misamis Visayan), *amodzjáka* (Manobo), *hunian-ño* (Tagalog), *bocaboca* (Moro). The young are reproduced from eggs which are deposited in trees, usually about aerial plants or in the axils of the leaves of certain trees. The adults are exceedingly agile and difficult to capture. Males and females usually vary greatly in color and markings; exceptions are found in *Draco volans* and *D. ornatus*, in which species the sexes differ but little. The differences appear very great in *D. rizali*, *D. quadrasi*, *D. spilopterus*, and *D. mindanensis*.

Dracos are unable to rise from the ground, and must take flight from some higher point. Their method of flight is to spread the wing membranes and sail. They do not move the wings up and down like a bird or bat. They feed largely on ants and other small insects. Like many other species of the Agamidæ and Iguanidæ they readily change color.

Key to the Philippine species of Draco Linnæus.

- a¹. Nostril lateral, directed outward, sometimes slightly upward and backward.
- b¹. Addressed hind leg reaches at the utmost slightly beyond elbow of addressed foreleg; tympanum distinct; a Y-shaped series of scales on forehead.
- c¹. No orbital spines; a prominent scale on posterior part of superciliary region sometimes present.
- d¹. Snout as long as diameter of orbit; tympanum smaller than eye opening.

- e*¹. Wing membranes with rows of rectangular brown spots above, black spotted below..... *D. volans* Linnaeus (p. 109).
- e*². Wing membranes of male with dark brown meshwork inclosing greenish white spots; immaculate below.
D. reticulatus Günther (p. 110)
- d*². Snout longer than orbit; tympanum as large as eye opening; wing membranes of female black marbled above, with one or two black spots on outer edge below.
D. guentheri Boulenger (p. 111).
- c*². A larger spinelike scale on the superciliary border.
- d*¹. Largest median dorsal scales at least twice as large as ventral scales; tympanum as large as eye opening; males, wing membranes brown with five large blue spots between ribs, black spots below; females, wing membranes black with blue spots; below immaculate..... *D. everetti* Boulenger (p. 112).
- d*². Dorsal scales hardly larger than ventrals; tympanum smaller than eye opening; wing membranes above spotted or marbled, black, below with spots or crossbands; lower surface of legs and a broad zone on belly blue; males, gular appendage red.
D. cornutus Günther (p. 114).
- d*³. Dorsal scales about equal to ventrals; tympanum equals eye opening; males above yellow-green to bluish; wing membranes blackish with wash spots of blue or green, below salmon or red with one or two small black spots; females gray, wing membranes black with rounded salmon spots, with salmon inside the outer border; below very large curved dark spots.
D. rizali Wandollek (p. 115).
- b*². Addressed hind leg reaches halfway from elbow to insertion of forearm; tympanum, if distinct, smaller than eye opening.
- c*¹. Snout longer than diameter of eye; a Y-shaped series of scales on forehead, a low compressed scale frequently present on superciliary edge; tympanum scaled or partly bare; wing membranes above blackish, inclosing whitish spots, below with a few black spots..... *D. ornatus* (Gray) (p. 117).
- c*². Snout nearly equals diameter of orbit; tympanum scaled.
- d*¹. A Y-shaped series of scales present or absent; males, with wing membranes spotted above with brown; below with black spots; females, wing membranes black with narrow whitish lines or white spots..... *D. spilopterus* (Wiegmann) (p. 119).
- d*². A Y-shaped series of scales on head; male, minute gular appendage longer than head; males with wing membranes yellow above, immaculate or with minute darker flecks and edged with darker; female dark with narrow whitish or grayish lines, a few dark spots below..... *D. quadrasi* Boettger (p. 123).
- c*³. Snout shorter than orbit; head small; tympanum scaly; male gular appendage shorter than head; males greenish to bluish gray with transverse spots, a black white-centered spot at corner of mouth; females same with two dark black-blue transverse stripes on neck..... *D. bimaculatus* Günther (p. 126).
- a*². Nostrils directed upward; snout as long as diameter of orbit; tympanum scaled..... *D. mindanensis* Stejneger (p. 128).

DRACO VOLANS Linnæus

PLATE 6, FIG. 3

Draco volans LINNÆUS, Syst. Nat. ed. 10, 1 (1758) 199; CANTOR, Cat. Mal. Rept. (1847) 37; GÜNTHER, Rept. Brit. India (1864) 124; BOULENGER, Cat. Liz. Brit. Mus. 1 (1884) 256; MOCQUARD, Nov. Arch. du Mus. III 2 (1890) 280; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 70, 71, fig. 43.

Draco praeos LINNÆUS, Syst. Nat. 1 (1758) 200.

Draco major LAURENTI, Syn. Rept. (1768) 50.

Draco minor LAURENTI, Syn. Rept. (1768) 51.

Draco viridis DAUDIN, Hist. Nat. Rept. 3 (1802) 301, pl. 41; KUHLE, Beitr. Zool. Vergl. Anat. (1820) 102; SCHLEGEL, Abbild. (1844) 89, pl. 24, fig. 1.

Draco fuscus DAUDIN, Hist. Nat. Rept. (1802) 307; KUHLE, Beitr. Zool. Vergl. Anat. (1820) 102.

Draco daudini DUMÉRIL and BIBRON, Erp. Gén. 4 (1837) 451.

Description of species.—(From six specimens from Palawan.) Snout as long as diameter of orbit; rostral broader than high, bordered by six to nine scales; nasal craterlike, nostril directed outward, slightly backward and upward, separated from rostral and labials by one or two scale rows, from each other by eight rows; an inverted Y-shaped series of enlarged keeled scales on snout; scales on head keeled or rugose, very unequal; two or three rows of scales in intersupraorbital region; a low compressed scale on posterior part of superciliary border, and a subconical tubercle on posterior upper edge of orbit; a row of seven or eight suborbital scales differentiated, separated from last upper labial by three scale rows; tympanum distinct, slightly smaller than eye opening; an enlarged scale on its anterior border; two or three much-enlarged scales extending in a row from orbit to above tympanum; two or three tubercles behind temporal region; nine or ten upper labials (usually ten), last largest; nine to twelve lower labials; mental about as wide as rostral, with two rows of enlarged scales running back to neck, parallel to labials but separated from them by two scale rows; nuchal crest very low and indistinct in males, not or barely discernible in females; no lateral nuchal crest; dorsal scales with or without distinct keels, very unequal, with a series of enlarged, keeled, distant scales on each side separated by about twenty-six scales rows; foreleg brought forward reaches beyond tip of snout; hind leg brought forward reaches almost to elbow; gular appendage of males about length of head (very small in females); lateral throat appendages not prominent.

Color in alcohol.—Above metallic variegated bluish brown, the brown usually forming undulating crossbands; back and sides usually flecked with numerous small, dark brown spots;

sides of neck strongly reticulated with brown; a distinct inter-orbital spot and a prominent nuchal spot of brown with a minute white spot on its anterior border; brown lines radiating from eyes; wing membranes dull orange, densely spotted with squarish brown spots arranged in rows; spots confluent and darker on outer border; a few dark spots beneath wings, and small spots on belly; gular appendage in male bluish, on tip purplish, at base not or but slightly reticulated with darker; in female throat greenish gray.

Measurements of Draco volans Linnæus, male and female.

| | No. 394 ♀ ^a | No. 395 ♂ |
|------------------|------------------------|------------------|
| | mm. | mm. |
| Total length | 212 | 195 |
| Tail | 132 | ^b 114 |
| Snout to vent | 80 | 81 |
| Snout to foreleg | 25 | 25 |
| Axilla to groin | 45 | 44 |
| Width of head | 11 | 10 |
| Length of head | 16 | 14.7 |
| Gular appendage | 4.5 | 15 |
| Foreleg | 34 | 34 |
| Hind leg | 39 | 36.5 |

^a Numbers refer to E. H. T. collection.

^b Tip missing.

Variation.—Judging by the descriptions of this species given by Günther, Cantor, and Stoliczka the markings and colorations in the species vary greatly. Five specimens from Palawan agree very well with each other in markings. Five specimens in the Santo Tomás Museum agree remarkably well with this description; in color and markings they are nearly identical and are probably from Palawan.

This is probably the best-known species of *Draco*; it occurs from the Malay Peninsula throughout the Malay Archipelago and Palawan. I believe it has not been discovered in other islands of the Philippine group.

DRACO RETICULATUS Günther

Draco reticulatus GÜNTHER, Rept. Brit. India (1864) 125; PETERS and DORIA, Ann. Mus. Genova 13 (1878) 374; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 257, pl. 20, fig. 1 (head); Proc. Zool. Soc. London (1897) 206; WERNER, Mitt. Natur. Mus. Hamburg (1910) 20.

Description of species.—(From Boulenger.) “Head small; snout as long as the diameter of the orbit; nostril directed outwards and slightly upwards; tympanum naked, smaller than the eye-opening. Upper head-scales very unequal, keeled; a

Y-shaped series of enlarged scales on the forehead; a compressed prominent scale on the posterior part of the supraciliary region; eight upper labials, the last twice as large as the preceding. The male's gular appendage as long as the head. Male with a distinct nuchal crest and with a similar crest along each side of the neck. Dorsal scales irregular, very feebly keeled, the largest at least twice as large as the ventrals; on each side of the posterior half of the trunk a continuous series of keeled scales, some of which are larger than the rest. The fore limb stretched forwards extends beyond the tip of the snout; the adpressed hind limb reaches slightly beyond the elbow of the adpressed fore limb."

Color.—"Brownish with metallic lustre above, with darker reticulation; wing-membranes above with a dark-brown mesh-work enclosing round greenish-white spots, below immaculate; throat and wattles with purplish-brown reticulation."

Measurements of Draco reticulatus Günther.

| | mm. |
|---------------|-----|
| Total length | 225 |
| Head | 16 |
| Width of head | 11 |
| Body | 69 |
| Foreleg | 35 |
| Hind leg | 41 |
| Tail | 140 |

Remarks.—I have seen no specimen referable to this species. The exact type locality appears to be unknown. The species is reported by Werner from Lombok, Sumba, Flores, Timor, Sanghir Islands, and Celebes.

DRACO GUENTHERI Boulenger

Draco guentheri BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 257, pl. 20, fig. 2 (head); WERNER, Mitt. Natur. Mus. Hamburg (1910) 9.

Description of species.—(From Boulenger.) "Head larger than in *D. volans*; snout a little longer than the orbit; nostril lateral, directed outwards; tympanum naked, as large as the eye-opening. Upper head-scales very unequal, keeled; a Y-shaped series of enlarged scales on the forehead; a compressed prominent scale on the posterior part of the supraciliary region; twelve upper labials, subequal. Dorsal scales irregular, keeled, the largest at least twice as large as the ventrals; on each side of the back a series of enlarged keeled distant scales. The fore limb stretched forwards extends to the tip of the snout; the adpressed hind limb reaches the elbow of the adpressed fore limb."

Color.—"Greenish gray with metallic lustre above, with very indistinct darker markings; a black spot between the orbits; wing-membranes largely black-marbled above, immaculate inferiorly except near the outer border, where there are one or two small black spots; lower surface of neck whitish, blackish-dotted."

Measurements of Draco guentheri Boulenger.

| | mm. |
|---------------|-----|
| Total length | 192 |
| Head | 16 |
| Width of head | 11 |
| Body | 55 |
| Foreleg | 28 |
| Hind leg | 34 |
| Tail | 121 |

Remarks.—This species, like the preceding, is founded on a single female specimen, the type, collected by Mr. Everett. The exact type locality is unknown.

DRACO EVERETTI Boulenger

PLATE 6, FIG. 2

Draco everetti BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 258, pl. 20, fig. 3; WANDOLLEK, Abh. Mus. Dresden (1900) 16.

Description of species.—(From No. 661, adult male; E. H. Taylor collection, collected in Bunawan, Agusan, 1913, by E. H. Taylor.) Snout slightly longer than diameter of orbit; rostral broader than high, bordered by seven scales; nasal conical, craterlike; nostril directed out and slightly back; separated from rostral and labials by two scale rows; separated from its fellow by six scales; a prominent Y-shaped series of enlarged, keeled scales present on snout; head scales keeled or rugose, occipitals and supraorbitals large; interorbital area with two small scale rows; a very prominent compressed spinelike scale on posterior superciliary border; upper labials eight (nine on left side), the last elongated, bordered above by a much enlarged scale; infraorbital scales distinctly enlarged, separated from labials by one row of small scales, continuous with the longitudinal series of enlarged scales which extend back from orbit; tympanum naked, with one or two enlarged scales on anterior border; ten lower labials; mental no wider than rostral, with a series of slightly enlarged chin shields running back on either side, parallel with labials but separated from them by two or three scale rows; scales on back rather large, unequal, more or less keeled, with a row of enlarged, keeled, distant scales

on each side, separated in the widest part by twenty-four scale rows; nuchal crest strongly developed; a small lateral nuchal crest and a series of four enlarged scales above and behind tympanum; a single conical scale behind temporal region; legs short; hind leg brought forward fails to reach elbow of adpressed foreleg.

Color in life.—Ground color above metallic brown, mixed with a lighter brown; two or three indistinct narrow light bands across back, that on shoulder distinct; a few other small whitish dots on back and on inner margin of wings; snout and neck dark brown; the nuchal crest blue; wing membranes brownish with minute lighter scales, and five large elongate blotches of yellowish green between ribs (ultramarine in alcohol). A white line below orbit; a small white spot in front of tympanum; throat and neck variegated brown reticulated with whitish; gular appendage purplish brown, the tip orange, reticulated with brown at base; lateral gular appendages reticulated with darker brown; tail annulate; underwing membranes with slightly darker spots; belly densely spotted brown.

Measurements of Draco everetti Boulenger, male and female.

| | Male. mm. | Female. mm. |
|------------------|--------------|----------------|
| Total length | 184 | 184 |
| Tail | 110 | 109 |
| Snout to vent | 74 | 75 |
| Snout to foreleg | 24 | 24 |
| Axilla to groin | 43 | 42 |
| Foreleg | 26 | 28 |
| Hind leg | 33 | 35 |
| Width of head | 10 | 10 |
| Length of head | 15 | 16 |
| Gular appendage | 21 | |

Variation.—A second specimen in the collection agrees better with Boulenger's type description as regards color. It is a female and differs markedly from the color description given here for the male. A description follows: A metallic bluish gray above with a faint suggestion of three lighter bands crossing back. No light spots on back; wing membranes with minute white scales in lines, along the ribs; on the inner third, large irregular blotches of bluish color surrounded by black between the ribs; throat and sides of neck light, very dimly reticulated with dark; below, wing membranes distinctly spotted with scattered blackish spots; a slight nuchal spot present, the interorbital spot distinct, with the brown on snout arranged in bands. Excepting sexual differences they agree very well in

scalation and proportions. The second specimen recorded is from Butuan, Agusan.

Remarks.—The specimens were captured in the afternoon while feeding on the boles of coconut trees. They apparently eat nothing but ants. The species appears to be rare, since no other was seen. The types were collected by Everett, one from Placer, northeastern Mindanao, the second (also a female) from Dinagat. Known only from these two islands. The type is larger than my specimens, having a length of 208 millimeters.

DRACO CORNUTUS Günther

Draco cornutus GÜNTHER, Rept. Brit. India (1864) 125; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 258, pl. 20, fig. 4 (head); WANDOLLEK, Abh. Mus. Dresden 9 (1900) 16; WERNER, Mitt. Natur. Mus. Hamburg 27 (1910) 9; TAYLOR, Philip. Journ. Sci. § D 13 (1918) 246.

Description of species.—(From Boulenger). "Head small; snout as long as the diameter of the orbit; nostril lateral, directed outwards; tympanum naked, smaller than the eye-opening. Upper head-scales very unequal, keeled; a Y-shaped series of enlarged scales on the forehead; a large compressed spine-like scale on the posterior part of the supraciliary region; eight or nine upper labials, the last twice or thrice as large as the preceding. The male's gular appendage as long as the head. A slight indication of a nuchal crest in both sexes. Dorsal scales subequal, keeled, small, hardly larger than the ventrals; a more or less distinct lateral series of enlarged keeled [sic] distant scales. The fore limb stretched forwards extends to the tip of the snout or slightly beyond; the adpressed hind limb does not reach the elbow of the adpressed fore limb."

Color.—"Upper surfaces variegated olive reddish-brown; a black spot between the orbits, another on the nape, and another on each side of the neck before the shoulders; wing-membranes above spotted or marbled with black and with the margin black, inferiorly with a few black spots or cross bands; lower surface of limbs and a broad zone along the belly blue in both sexes; throat with blue-green variegations; the male's gular appendage red."

Measurements of Draco cornutus Günther.

| | mm. |
|---------------|-----|
| Total length | 222 |
| Head | 16 |
| Width of head | 11 |
| Body | 76 |
| Foreleg | 30 |
| Hind leg | 36 |
| Tail | 130 |

Remarks.—This species is included in the Philippine fauna solely on the strength of Werner's record. His specimen is from Jolo. I strongly suspect that it is in reality *D. rizali* Wandollek.

DRACO RIZALI Wandollek

PLATE 7, FIGS. 3 AND 4

Draco rizali WANDOLLEK, Abh. Mus. Dresden IX 9 (1900-1901) 15, pl., fig. 6; TAYLOR, Philip. Journ. Sci. § D 13 (1918) 245.

Description of species.—(From a series of specimens in the Bureau of Science collection from Zamboanga and Sulu Archipelago, collected September and October, 1917, by E. H. Taylor.) Owing to the fact that the sexes are different I shall describe the male and female separately.

Male.—Rostral large, very much broader than high, surrounded by seven or, usually, eight scales; nasal somewhat elongate, nostril directed outward and slightly upward and backward, separated from rostral and first labials by two scales and from its fellow by five to seven scales; a series of enlarged strongly keeled scales on head uniformly arranged in Y-shaped formation; canthus rostralis formed by three or four much-enlarged, sharp-edged scales continuous with the superciliary edge, the latter also sharp and formed of enlarged scales which continue to above middle of eye and then suddenly cease; a conical, or somewhat compressed, prominent spine on posterior part of superciliary edge; another prominent conical tubercle on posterior part of orbit; scales on supraorbital areas large, somewhat keeled, the enlarged scales separated from the superciliary edge by several rows of minute scales; occipital scales large, irregular, rugose; a row of scales under orbit, posterior side of orbit usually enlarged with a row of enlarged scales extending back to above tympanum; later naked, about size of eye opening, with usually an elongate, slightly enlarged scale immediately in front; nine to eleven upper labials, the last usually elongate, first very small; an enlarged scale usually above last labial; labials separated from suboculars by two or three scale rows; mental as large as rostral, bordered by seven or eight scales; gular appendage a little longer than head, much narrowed toward tip; nuchal crest very prominent; lateral crests very low; two spiny scales back of temporal region above tympanum; a row of enlarged, keeled distant scales on sides varying in distinctness, very prominent or dim, more or less continuous with lateral nuchal crests; wing membranes moderate; scales on tail keeled, those on back only slightly or not keeled; about twenty-five rows

of scales between the keeled outer rows in widest part; belly scales strongly keeled, the scales not as large as largest dorsal scales; foreleg brought forward reaches beyond end of snout; hind leg brought forward reaches elbow of adpressed foreleg; fourth finger and toe slightly longer than third; lateral nuchal appendages angular, not prominent.

Female.—In adult female specimens the head is much larger and wider, the nuchal crest indistinct or wanting; the gular appendage is wanting but on the fold of skin that represents the appendage in the female there is invariably present a small tit or barb of skin about 1 millimeter long and about as wide at base; there is an average of one or two more labials than in males; the hind leg brought forward usually reaches elbow of foreleg, except in the largest specimen.

Color in life.—The sexes vary markedly in color and markings.

Female.—Metallic, iridescent gray, with dim, narrow, blackish reticulations, sometimes forming dim, irregular, brownish bands across back; a few indistinct whitish spots laterally; a large nuchal and an interorbital dark spot with dark markings or reticulations on side of head; frequently radiating lines from eye; shoulders with or without a greenish wash; tail gray to brown with broad, fairly distinct bars of darker brown; below, belly cream-white, reticulated with darker; throat and chin reticulated with bluish; wing membranes above black, slightly washed with gray, inclosing bright reddish to orange spots; these spots are lighter nearest the body, and are of deeper red color near outer border of wing; below, light, with a light wash of yellow. Several small black spots near upper and outer borders; sometimes small spots scattered on entire undersurface.

Male.—Brilliant yellow-green, somewhat metallic, with occasional scales of a lighter color. Wing membranes darker with numerous (usually) roundish spots of bluish to yellowish green, the outer edge light salmon washed with gray. Head with the interorbital dark spot, the nuchal spot absent; dark markings either present or absent on sides of head; below, belly and wing membranes salmon color to brick red, usually with only one large or small dark spot in outer margin of wing; gular appendage canary yellow at tip, the remainder bright purple to wine color, a green wash at base; throat and chin reticulated with darker; belly with very dim reticulations of darker, either present or absent.

The males can make extremely rapid changes of color. They change from light to dark green, to light, or dark reddish brown in less than a minute, and vice versa. When the brown specimens are placed in alcohol the green returns largely and when fixed they are blue-green to blue in color, the salmon below largely disappearing. The head markings vary considerably in preserved specimens.

Measurements of Draco rizali Wandollek.

| | Female. mm. | Male. mm. |
|-----------------------|----------------|--------------|
| Total length | 210 | 209 |
| Snout to vent | 81 | 81.5 |
| Tail | 129 | 127.5 |
| Snout to foreleg | 27 | 27 |
| Axilla to groin | 48.5 | 45 |
| Length of head | 18 | 16.2 |
| Width of head | 12.5 | 11 |
| Interorbital distance | 11 | 10 |
| Foreleg | 33 | 32.5 |
| Hind leg | 38.5 | 37 |

Remarks.—I have referred to this species the common *Draco* of Sulu Archipelago. The type is from northwestern Mindanao. I have taken several specimens in Zamboanga. The type was collected by Dr. José Rizal while exiled in Dapitan. Thanks to Prof. Austin Craig, of the University of the Philippines, I have been able to obtain a print from a photograph of the type specimen, taken by him in the Dresden Museum.

One striking difference between the sexes, which the photograph of the Bureau of Science here reproduced has failed to show, is that the light spots on the female are readily discernible through the wing, while the spots on the male are more in the nature of a wash and can scarcely be discerned, or not at all, through the membrane.

DRACO ORNATUS (Gray)

PLATE 6, FIG. 1

Dracunculus ornatus GRAY, Cat. Liz. (1845) 235.

Draco ornatus GÜNTHER, Proc. Zool. Soc. London (1873) 167; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 259; BOETTGER, Ber. Senck. Nat. Ges. (1886) 97; WERNER, Mitt. Natur. Mus. Hamburg 27 (1910) 17.

Description of species.—(Described from four specimens from E. H. Taylor collection; collected 1912–1913, in Agusan Valley, Mindanao, by E. H. Taylor.) Snout longer than diameter of orbit; rostral wider than deep, bordered by six or seven scales;

nasals conical, craterlike, rather low, pointing almost directly outward, separated from rostral by two rows of scales, from labials by two (sometimes three) scale rows and from each other by from six to eight scales; a Y-shaped series of enlarged, keeled scales on snout, distinct; superciliary edge with a single, very low, enlarged, compressed scale, sometimes replaced by two or three smaller scales, or they may be entirely wanting; the compressed scale on the upper posterior border of orbit very prominent; all head scales strongly keeled or rugose; occipitals about as large as scales on supraorbital region; interorbital region with four or five rows of small scales; eight to ten upper labials, usually nine, the last usually elongate with an enlarged scale directly above; posterior infraorbital scales not distinctly enlarged; a longitudinal group of prominent scales behind orbit, three to five in number; tympanum scaled or partly bare; an enlarged white scale surrounded by several small white scales directly in front of tympanum; eight to ten lower labials; mental wider than rostral; a row of enlarged scales run back on either side from mental, separated from labials by one or two rows of scales; two or three prominent spines at back of head; scales on body not or but slightly keeled with a row of keeled, unequal scales on either side, the largest arranged in groups, not continuous, separated by twenty-four to twenty-six rows of scales in widest part of back; a nuchal crest, rather prominent; foreleg brought forward reaches much beyond snout; hind leg brought forward reaches axilla; gular appendage of male as long as or minutely longer than head, very small in females; lateral nuchal appendages fairly well developed; no lateral nuchal crest.

Color in life.—Above metallic greenish blue with darker and lighter marking; usually with a row of greenish white spots covering the groups of enlarged lateral scales; wing membranes with blackish reticulations arranged so as to inclose rounded, yellowish white spots arranged in continuous rows; neck greenish; head gray-blue with black spots or bands; the interorbital spot distinct; labials and sides of head and neck lighter, spotted or reticulated with black; gular appendage of male gray-blue, reticulated with blackish or dark bluish spots or lines, tipped with orange; chin with bluish and whitish spots or reticulations; throat of female crossed by numerous wavy dark lines; belly with a few scattered small dark specks; wing membranes below with dark spots, the largest near outer border.

Measurements of Draco ornatus (Gray), largest female specimen.

| | mm. |
|------------------|------|
| Total length | 226 |
| Tail | 145 |
| Snout to vent | 81 |
| Axilla to groin | 43 |
| Snout to foreleg | 26 |
| Foreleg | 35 |
| Hind leg | 43.5 |
| Head width | 12 |
| Head length | 18 |

Remarks.—The number and distinctness of the rounded white spots vary; they are less distinct in the male than in the female specimen. The gular appendage on the largest male measures 16.5 millimeters. The four specimens studied were taken at Bunawan, in the upper Agusan Valley, all in the same immediate locality. This form seems to be widely distributed in the Islands. Boulenger reports it from Luzon, Negros, and Dinagat. Its habits are quite similar to those of other species of *Draco*. It feeds largely on ants.

Werner's opinion that *Draco ornatus* is the female of *Draco spilopterus* is certainly incorrect.

DRACO SPILOPTERUS (Wiegmann)

PLATE 6, FIG. 4

Dracunculus spilopterus WIEGMANN, Nova Acta Acad. Caes.-Leop. I 17 (1835) 216, pl. 15; GRAY, Cat. Rept. Brit. Mus. (1848) 236.

Draco spilopterus DUMÉRIL and BIBRON, Erp. Gén. 4 (1837) 461; GERVAIS, in Eyd. Voy. Favorite; Zool. Atlas, pl. 27; SCHLEGEL, Ab-bild. (1844) pl. 92; BOULENGER, Cat. Rept. Brit. Mus. 1 (1885) 260.

Dracontoidis personatus FITZINGER, Syst. Rept. (1843) 51.

Description of species.—(From seven male specimens from Luzon.) Snout about as long as diameter of orbit; rostral varies from low and broad to nearly round, bordered by from five to seven scales; behind separated from nasal by three rows of scales; nasal conical, crater-shaped, directed outward, slightly upward, and backward, separated from its fellow by six to nine scales; the supranasals elongate, slightly prominent; scales on head very irregular, those on canthus rostralis large, compressed; enlarged scales on snout either arranged in a straight line or, more usually, a Y-shaped series; part of supraorbital region covered with large keeled scales; occipitals large, rugose, but not keeled; no compressed scale on posterior superciliary border; a rather prominent scale on posterior border of orbit;

three to five small scale rows in interorbital space; nine to eleven upper labials, last usually much elongate; nine to eleven lower labials; a row of suboculars below latter half of orbit, rather prominent, separated from labials by three to four rows of scales; a row of three or four large, prominent scales back of eye; tympanum covered with several scales larger than the surrounding ones; body with rather large keeled scales on back with a series of distant large scales forming indistinct lines on either side, separated from each other by twenty-two to twenty-four rows of scales, and on neck forming slight, continuous, lateral crests; a dorsal nuchal crest rather prominent; two or three scattered prominent scales back of temporal region; gular appendage one and one-half times length of head; foreleg brought forward reaches much beyond snout; hind leg contained in axilla-to-groin distance about one and one-tenth times; lateral nuchal appendages rather small.

Color in life.—Greenish gray above with metallic reflections, slightly iridescent, with small brownish spots on sides of body and neck. Wing membranes above with numerous small brown spots over a light yellowish to dull orange field, with a large, dark, irregular spot near upper, outer border; below light, without spots save on extreme border; gular appendage orange with blackish brown reticulations at base and on chin; a strong brown bar across snout, and a green and purple area in occipital region. In some specimens an interorbital spot is present, in others wanting.

Measurements of Draco spilopterus (Wiegmann).

[Average of seven nearly equal-sized specimens.]

| | mm. |
|------------------|------|
| Total length | 201 |
| Snout to vent | 77 |
| Tail | 124 |
| Head length | 15.2 |
| Head width | 9.4 |
| Snout to foreleg | 26 |
| Axilla to groin | 41 |
| Foreleg | 34 |
| Hind leg | 38.4 |
| Gular appendage | 23 |

Variation.—(Male.) In the collection of the Santo Tomás University there are several male specimens of this species. With one exception they agree fairly well with the specimens here recorded. In none however is the series of enlarged scales on snout arranged in a Y-shaped formation. All agree

in having the tympanum scaled, nostrils pointed directly outward, and a few larger spots on the outer part of the wings. There are about twenty-five scale rows between the enlarged outer rows of keeled scales which are not very distinct.

Female.—For the most part the females are larger than the males, and markings and coloration are entirely different. The following is a color description of a large female in alcohol from the collection of W. Schultze, Manila, collected at Montalban, Luzon: Above variegated olive to grayish brown; body traversed by three prominent, variegated, irregular, darker spots; the line of enlarged scales on either side of body darker olive brownish; one spot across shoulders and a very strong nuchal spot; head dull bluish gray or very light ultramarine, with a transverse bar across head and supraorbital regions; snout blackish; numerous blackish flecks on sides of head and neck; wing membranes black with whitish spots on inner part and with very narrow diagonal stripes of whitish; below throat brownish with dark specks; belly pale ultramarine; wing membranes below with a large outer dark area and numerous smaller blackish spots; forelegs transversely barred, and hind legs and toes spotted or barred with darker; base of tail with transverse bars.

A second adult female from the same collection is marked similarly, save that the back is rather coppery brown, with more or less metallic iridescence, and the light spots are almost entirely wanting on the wing membranes. Two young females have the dark interorbital stripe merged into the dark color of the anterior part of forehead; the light spots on inner part of wing membranes are contiguous, forming more or less distinct transverse lines; transverse marks on back are very distinct; one is of coppery brown. A very young female (measuring, snout to vent, 30 millimeters) has the wing membranes whitish with a large outer dark spot, and numerous scattered dark spots arranged in transverse rows, thus approaching the markings of the male.

In the species there appears to be a number of regional variations which at first I was inclined to regard as worthy of subspecific distinction; with examination of a larger series of specimens I find that in these regional groups there is also certain variation which would tend to break down the distinctions drawn between the various groups. The chief distinctions are as follows:

1. Adult male, with gular appendage equal to distance between tip of snout and near elbow, the foreleg being brought back; dorsal scales rather large, unequal, moderately keeled, a row of enlarged keeled scales along sides; male with a distinct nuchal crest; a Y-shaped series of scales on forehead; interorbital spot dim or wanting in both males and females; no nuchal spot. Wing membranes of males yellow to orange, spotted brown, the spots arranged in regular transverse rows; below unspotted. Female with wing membranes black, with numerous, diagonal, threadlike, whitish stripes, occasionally with lighter spots near body, especially in young; underside with numerous dark spots; tympanum, with two exceptions, covered. Eighteen specimens from Lubang Island and four from Mount Mariveles, Bataan (this part of Luzon is nearest Lubang Island).

2. Gular appendage of adult male equal to distance from tip of snout to forearm or axilla; two to four median scale rows on back enlarged, strongly keeled, the lateral scales smaller than on first group. A row of enlarged keeled scales present on sides, a Y-shaped series of scales on forehead, a distinct interorbital spot present in both sexes, a nuchal spot present in females. Wing membranes yellow to orange with numerous, irregularly arranged, brownish spots and a large outer dark spot; below immaculate or with one dark spot; females with membranes black, with numerous diagonal, lighter, fine stripes, and whitish spots near inner border. Four males and four females examined, from mountains of Luzon, near Montalban and Sibul Springs.

3. Gular appendage equal to distance from tip of snout to axilla or somewhat beyond; six or eight rows of small median keeled scales; scales outside these very small, also strongly keeled; no outer row of enlarged keeled scales; a longitudinal row of enlarged keeled scales on forehead; tympanum naked, smaller than eye opening; wing membranes rather sparsely spotted black on light (yellow?) ground with large outer spot; a very small spot on outer tip of wing below. Two males from Negros.*

4. Gular appendage fails to reach insertion of arm. Scales on back not very strongly keeled, the median and laterals not clearly differentiated; a longitudinal row of enlarged keeled scales on forehead; tympanum partly naked; wing membranes

* These specimens were examined through the kindness of Dr. J. W. Chapman, of Silliman Institute, Dumaguete, Oriental Negros, to which institution they belong.

so densely spotted with brown spots that the ground color appears brown reticulated with light, below with numerous brown spots. One male specimen examined, Bureau of Science specimen No. 817; from Siquijor?

There are three female specimens which I am unable to associate positively with these groups; they very probably belong to either the third or fourth. Two specimens from northern Negros have the head very large, one with a Y-shaped, the other with a longitudinal, series of scales on forehead; wing membranes black-brown reticulated with whitish; below with one or two small spots on outer edge.

A specimen from southern Negros has the longitudinal row of scales on snout, the wing membranes black with indistinct lighter markings arranged in curved transverse series, and is spotted below with black along the outer border. The scales on the back in each of the three specimens are rather dimly keeled and not enlarged, and there is a row of small keeled scales on the sides.

A fourth female which may represent a fifth group, has the wing membranes black, with fine whitish striations and lighter spots visible when held to the light; below are numerous black spots; the scales are nearly smooth above. The tympanum is scaled. (No. 396 E. H. Taylor collection. Locality unknown.)

Remarks.—It is highly probable that with additional material it will be possible to relegate certain of these forms to species or subspecies. This does not seem feasible at the present time.

The species is known from Negros, Mindoro, Lubang, and central Luzon.

DRACO QUADRASI Boettger

PLATE 8, FIGS. 1 AND 2

Draco quadrasi BOETTGER, Kat. Senckenb. Mus. (1893) 94; WERNER, Mitt. Natur. Mus. Hamburg; BOULENGER, Proc. Zool. Soc. London (1894) 773.

Description of species.—(From Nos. 1816 and 1818, E. H. Taylor collection; collected in Sibuyan, by C. M. Weber.) (Adult male.) Head moderate, similar to *Draco spilopterus*, the snout equal or nearly equal to diameter of eye; rostral rather large, bordered by eight scales, separated from nostril by two scales; nostril points outward and upward, and slightly backward; a Y-shaped series of enlarged irregular scales on snout; canthus rostralis rugged; scales on head very irregular, strongly keeled; a scale on posterior part of orbit slightly prominent; no compressed spinelike scale on superciliary edge but, instead, a

continuous series of small, slightly enlarged, keeled scales, bordered by small granular scales; occipital scales large; ten upper labials, the last two or three times as long as those preceding; a series of enlarged scales behind and under posterior part of eye; a series of three or four scales forms a longitudinal row from eye to above tympanum; tympanum covered with small scales preceded by a slightly prominent enlarged scale; a strong longitudinal skin fold on neck surmounted by a serrated nuchal crest usually folded over, forming a wavy line; ten lower labials; mental small; the diverging rows of chin shields very small and not strongly differentiated; scales on chin small and equal; largest scales on back distinctly larger than belly scales; the six median dorsal rows largest, strongly keeled, the keels forming continuous longitudinal lines; a row of enlarged irregular scales on each side, strongly keeled, almost continuous, not noticeable on sides of neck; no lateral nuchal crest; about eighteen scale rows across back, between these outer enlarged rows at their widest divergence; gular appendage much longer than head, almost equal to distance from snout to shoulder; foreleg brought forward the wrist reaches end of snout; hind leg brought forward reaches axilla; thirteen or fourteen enlarged scales form a fringe on posterior aspect of thigh.

Color in alcohol.—Above metallic lavender-brown to olive brown or gray with darker and lighter areas; neck with bluish cast; no nuchal spot; head darker with an interorbital spot and darker brown markings on snout; edges of eyelids whitish; orbit very dark brown or black; a few spots of darker on labials; prominent bluish black spots in temporal region immediately behind orbit; lateral gular appendages, chin, and throat yellow to gray with small spots or reticulations; gular appendage olive gray to yellowish at base; tip bright lemon yellow; wing membranes yellow with the outer edge dark gray and black; traces of grayish darker lines barely evident; below, uniform yellowish with outer area dark; belly bluish gray to whitish with small darker spots; tail same as body.

Variation.—Many specimens in the collection vary slightly from these markings. In many the wing membranes are yellow with numerous darker yellow spots on the surface; the blackish dots on the belly are sometimes absent. In younger male specimens the wings show but little yellow and the markings approach those of the female. The brilliant yellow tip on the gular appendage is always present.

Adult female.—The female differs from the male in being larger and more heavily built; the nostrils are directed more nearly upward than outward; the rostral is prominent, rugose; the Y-shaped marking is prominent, the anterior part forming a straight keel; supraocular region is wider, and the line of scales on the superciliary edge is not so prominent or continuous; the occipital scales are rather regular and large; there are eleven upper labials, the last three times as large as the preceding; there are five or six rows of scales between labials and orbit; there is no enlarged subocular series as in males, and the postorbital series which extends to above tympanum is prominent, composed of two much-enlarged scales; this series is touched by a series of smaller scales which border the posterior part of the temporal region; the tympanum is rather depressed, and covered with small scales; the lateral gular appendages are smaller; there are two small, spinelike scales above and slightly posterior to tympanum, there is a slight trace of scales on back, rather irregular, the seven median rows largest, and their keels form continuous rows; a distant row of keeled scales is prominent on each side, separated by eighteen scales at the greatest width; hind leg reaches axilla.

Color in alcohol.—(Freshly preserved.) Above mottled and variegated, bluish green, olive, to grayish brown, to lavender, with darker variations, a distinct series of brown horseshoe markings on the back, and a series of darker brown markings along the outer series of keeled scales on sides; a distinct nuchal, black-brown spot and a very prominent interorbital black spot; radiating dark lines from orbit; labials dimly barred with dark; anterior part of head mottled brown with a dim transverse stripe passing through interorbital spot; usually a light line below orbit and an indistinct lighter spot behind orbit; wing membranes black with traces of grayish transverse broad lines, and numerous narrow, elongate, grayish spots forming curved lines running longitudinally; outer part of wing darkest with scattered grayish spots; wings below with a yellow wash and a few outer dark spots; chin light, peppered with brown; an oval white spot on the very slight gular fold; belly iridescent without spots.

Variation.—The dorsal scales vary in size; the distinctness of the keeled outer row of scales also varies, being indistinct in certain specimens and prominent in others. The color patterns on back vary greatly, but the nuchal spot is always present.

Measurements of Draco quadrasi Boettger.

| | Male. mm. | Female. mm. |
|------------------|--------------|----------------|
| Total length | 218 | 235 |
| Snout to vent | 79 | 85 |
| Tail | 139 | 150 |
| Snout to foreleg | 27 | 29 |
| Axilla to groin | 41 | 45 |
| Width of head | 10 | 11.5 |
| Length of head | 16 | 18 |
| Foreleg | 34 | 40 |
| Hind leg | 42 | 46 |

Remarks.—Thanks to Mr. C. M. Weber, I have been able to obtain a remarkable series of two hundred twenty-two specimens of this little-known Philippine species. Of these eighty-six were females, and one hundred thirty-six males. All are from Sibuyan. No specimen has yet been taken elsewhere in the Visayas, but it very probably occurs in Romblon and Tablas, since it is found in Mindoro. The males and females are very different in appearance. The following characters are constant throughout the series. The male has a brilliant, immaculate, yellow gular appendage, a strong nuchal fold with small serrated crest; the wings are yellow and the orbit black or dark brown; the female has a larger body and a larger head with distinct nuchal and interorbital spots. The orbit is never of a solid color. The light spot on the throat, the blackish wings with grayish spots forming curved longitudinal lines, and a lemon yellow wash on wing membrane below are constant characters. In the young these sex differences are not so evident, as the young males resemble the females.

The species is very distinct; its closest affinity appears to be *Draco spilopterus*. The species appears to have been collected for the first time in Sibuyan by José Quadras, for whom it was named by Boettger. I collected a single specimen on the western coast of Mindoro.

DRACO BIMACULATUS Günther

PLATE 7, FIGS. 1 AND 2

Draco bimaculatus GÜNTHER, Rept. Brit. India (1864) 127; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 263, pl. 20, fig. 6; BOETTGER, Ber. Senck. Nat. Ges. (1886) 97; CASTO DE ELERA, Cat. Fauna Filipinas 1 (1895) 414; TAYLOR, Philip. Journ. Sci. § D 13 (1918) 246, pl. 2, figs. 1, 2.

Description of species.—(Based on eighteen specimens in E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, 1912–1913, by E. H. Taylor.) Head small, snout slightly

less than diameter of orbit; rostral wide and low usually, and smaller than mental, usually about twice as wide as high, bordered behind by five or six small subequal scales, and narrowly in contact with first upper labial; nasal scale large, conical, separated from rostral and labials by two or three rows of scales; nostril round, craterlike, lateral, directed outward and slightly backward; head scales rather variable, strongly keeled; inter-orbital region narrow, supraorbital region rather clearly delineated by a series of more or less enlarged scales, beginning with three or four greatly elongated keeled scales, which are found above and in front of anterior border of orbit; a small, rather rounding tubercle above posterior part of orbit; the supra-orbital scales vary, those on inner part larger, those along posterior outer part very small; a series of longitudinally enlarged scales on snout, usually taking the form of the letter T, I, or Y (inverted); eight to ten upper labials, the last usually largest; an equal number of lower labials; tympanum unscaled, a few enlarged scales between tympanum and orbit; four scales border mental, outer largest; male with a slight nuchal crest, barely indicated in female; dorsal scales rather regular, not or slightly keeled, about thirty-five across back; on outer part on each side near parachute a broken series of enlarged, keeled, distant scales; scales on arms, legs, and abdomen strongly keeled; foreleg stretched forward almost reaches the point of snout; adpressed hind leg reaches shoulder; gular appendage of male nearly as long as head; that of female very much smaller; lateral flaps on side of neck as wide as distance from orbit to tip of snout; a prominent row of serrated scales on posterior aspect of thigh.

Color in life.—Upper surface with a metallic, slightly iridescent gloss, greenish gray to bluish gray with numerous more or less distinct, broad, irregular, dark bands, traces of which are frequently found on wing membranes; a distinct nuchal spot; head and neck with various dark spots, usually an inter-orbital spot, and a prominent, roundish, black spot behind angle of jaws with a minute white center; tail barred with dark and light bands; wing membranes striated, above with thin bluish white lines, twelve to fifteen in number, running lengthwise, the ground color bluish gray; below wing membranes with numerous large black spots; chin with darker and lighter reticulations; belly frequently with black dots; gular appendage bluish white to greenish gray, to yellowish, usually paper white, with indistinct darker areas. Female has two broad distinct black bands, beginning at base of neck flaps, crossing neck,

separated by a band of blue; these involve the small gular appendage and are interrupted by a narrow blue line which follows its edge; usually fewer dark bands across the back, and suggestions of transverse white bar on upper wing membranes are also present in the female.

Measurements of Draco bimaculatus Günther.

| | mm. |
|--------------------------------|------|
| Total length | 192 |
| Snout to vent | 67 |
| Tail | 125 |
| Snout to foreleg | 22.5 |
| Axilla to groin | 36 |
| Width of body (wings extended) | 58 |
| Gular appendage | 11 |
| Foreleg | 35 |
| Hind leg | 40 |

Remarks.—This species is common in the upper Agusan Valley. The dracos usually feed on exposed trunks of trees in the afternoon and generally in the sunshine. They are very elusive creatures. Several were obtained for me by Manobo boys by the use of blow guns. Females usually lay two eggs, about 15 millimeters long and 9 millimeters wide, finely striated. Specimens were obtained in Zamboanga and the species was observed in Tawitawi.

The type locality is "Philippines." The types were collected by Cuming. Everett collected specimens in Dinagat.

DRACO MINDANENSIS Stejneger

Draco mindanensis STEJNEGER, Proc. U. S. Nat. Mus. 33 (1908) 677.

Description of type.—(Adult male.) (From Stejneger.) "Snout as long as diameter of orbit; rostral wide and low, more than twice as wide as high, bordered behind by seven subequal, nearly regularly pentagonal scales and slightly in contact with first supralabial; nostril directed upward, perfectly vertical, separated from rostral by three rows of scales and from supralabial by three or four scales; interorbital space narrow; scales on top of head small, more or less keeled, with a slightly developed median series of larger, keeled scales on top of snout, but without any posterior, diverging branches; about five small scales in a line across the middle of the interorbital space and about thirteen across the supraocular region, the outer ones being almost granules, the median ones larger, irregular, hexagonal; a small, blunt spine at posterior end of superciliary margin; occipital shield scarcely differentiated, surrounded by subequal,

keeled scales; tympanum hidden by small scales; fifteen supralabials; mental large, nearly as wide as rostral, triangular; a nuchal fold, but no median series of enlarged scales; upper surface of body covered with small, keeled scales, largest on the middle portion of the back, becoming gradually smaller on the sides toward the parachute, the larger about the same size as the ventrals; a few dorsolateral enlarged scales barely indicated; the gular appendage broadly triangular, with posterior outline nearly straight, slightly longer than the head, the scales elongate, somewhat increasing in length toward the tip, where they almost reach the size of the ventrals; lateral neck fans very large, with rounded outline, the peripheral scales large and elongate above; forelegs long and slender, the wrist extending to the tip of the snout; extended hind leg reaches to the shoulder; posterior edge of tibia and femur strongly serrate, with a group of three large scales at the upper end near the body; tail nearly twice as long as head and body together."

Color in alcohol.—"Above dull grayish brown, almost sepia, with pale rounded spots; on the back about five transverse series of whitish round spots alternating with four transverse series of larger, more conspicuous spots consisting of a median nearly lozenge-shaped spot with a large circular spot on each side; upper side of parachute slightly paler than the back and somewhat more reddish especially posteriorly, with numerous longitudinal whitish lines narrow and of uneven width, like very elongate beads on fine threads; underside whitish; throat brownish gray with indistinct paler spots; gular appendage pale yellow, with a fine dusky line on each scale on the anterior margin; no spots on underside of parachute; limbs and tail above cross barred, dark grayish brown and whitish in strong contrast."

Measurements of Draco mindanensis Stejneger.

| | mm. |
|---------------------------------------|-----|
| Total length | 261 |
| Tip of snout to vent | 90 |
| Vent to tip of tail | 171 |
| Width of head | 13 |
| Foreleg | 45 |
| Hind leg | 55 |
| Tip of snout to posterior end of jaws | 19 |
| Gular appendage | 18 |

Remarks.—Stejneger remarks that the present species is related to *Draco quinquefasciatus* and *Draco maximus* but that it differs from both in many characteristics. It is founded on two male specimens in the United States National Museum, Nos.

37388 and 37387. The latter specimen differs from the former, which is the type, in having the occipital scales much better differentiated, being rounded plates almost as large as the nasal. The gular appendage is also a few millimeters longer. The color is nearly identical, but there is a very distinct whitish line on the middle of the forehead, and another across the supraocular region.

Type locality "Datu Anib's place, near Calagan, northwest Mindanao, at base of Malindang Mountain, 1,100 ft. altitude." Known only from this locality. The types were collected by Dr. E. A. Mearns.

Genus GONYOCEPHALUS Kaup

Gonyocephalus KAUP, Isis (1825) 590; (1827) 614; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 282.

Lophyurus, part., (non Latreille) DUMÉRIL and BIBRON, Erp. Gen. 4 (1837) 410.

Lophosaurus FITZINGER, Syst. Rept. (1843) 45.

Dilophyrus GRAY, Cat. Liz. (1845) 238; GÜNTHER, Rept. Brit. India (1864) 136.

Tiaris GRAY, Cat. Liz. (1845) 239; GÜNTHER, Rept. Brit. India (1864) 151.

Coryphophylax (Fitzinger) STEINDACHNER, Novara, Rept. (1867) 30.

Hypsilurus PETERS, Mon. Berl. Ak. (1867) 707.

Arua DORIA, Ann. Mus. Genova 6 (1874) 345.

Lophosteus PETERS and DORIA, Ann. Mus. Genova 13 (1878) 377.

Body compressed with elongate tail; tympanum distinct. Dorsal scales small, becoming larger laterally, usually intermixed with larger scales. A dorsal crest and a gular fold; male with a small gular sac. No preanal or femoral pores.

Three species of this genus are recognized from the Philippines. They are terrestrial and arboreal. They feed on the ground, on insects and the larvæ of beetles, and live for the most part in holes in trees. They are sometimes found under rotting logs, feeding. On being exposed they frequently remain perfectly quiet, trusting to their coloration to escape observation, and even when touched frequently maintain the same attitude. They readily change their colors and markings. The eggs are usually elongate in shape.

Key to the Philippine species of Gonyocephalus Kaup.

α^1 . Nuchal and dorsal crests continuous; a few scattered enlarged scales among dorsals..... *G. sophiæ* (Gray) (p. 133).

α^2 . Nuchal and dorsal crests separated.

b^1 . Enlarged dorsal scales forming a row parallel to the dorsal crest; scattered scales on sides..... *G. semperi* (Peters) (p. 131).

b^2 . No row of scales parallel to dorsal crest; scales on sides arranged in irregular vertical rows..... *G. interruptus* Boulenger (p. 134).

GONYOCEPHALUS SEMPERI (Peters)

Lophyrurus (Tiaris) semperi PETERS, Mon. Berl. Ak. (1867) 16.

Gonyocephalus semperi BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 289.

Description of species.—(From No. 765, E. H. Taylor collection; collected at Bunawan, Agusan Province, Mindanao, 1912, by E. H. Taylor.) Snout not as long as diameter of orbit; nostril slightly farther from orbit than tympanum; rostral large, bordered by eight scales; nasal rather large, lateral, separated from rostral and first labial by one scale; canthus rostralis sharp, slightly projecting, continuous with superciliary edge, which continues almost to posterior border of orbit; a curved row of slightly enlarged scales below and behind orbit, with three large postorbital scales extending to above tympanum; forehead much depressed with a median row of enlarged keeled scales delineated by a curved row of slightly enlarged keeled scales, which are separated from each other by seven or eight rows of small scales; occipital scales irregular with two slight bony knobs present, somewhat anterior to the beginning of the nuchal crest; tympanum large, more than two-thirds diameter of eye, separated from orbit by a distance less than its diameter; twelve and thirteen upper labials, the last small; bordered above by a row of enlarged scales anteriorly; separated from suboculars by two scale rows; twelve and thirteen lower labials; mental narrow; two diverging rows of chin shields, first pair in contact bordering mental; first two or three pairs border labials; balance separated from labials by from one to three scale rows; scales on chin and neck small, rather equal, with no median prominent row; a few scattered enlarged scales on temporal region and on angle of jaw; gular pouch small; nuchal crest very low, not continuous with dorsal crest; a row of enlarged, somewhat keeled or spiny scales run from shoulder to base of tail parallel with dorsal crest; numerous enlarged scales on sides, arranged in irregular vertical rows; scales on back minute, becoming larger laterally; belly scales strongly keeled; front leg brought forward, wrist reaches end of snout; hind leg brought forward reaches tip of snout; fourth finger longest; a number of scattered enlarged scales on thigh.

Color in life.—Above greenish to olive brown with fairly distinct transverse bars or blotches of darker brown across back, which continue to tip of tail and encircle the tail; one bar crosses neck, and is usually more prominent than the others; arms, legs, and digits barred with darker brown; sides darker, the enlarged scales usually yellow; head variegated brown, with a lighter stripe across head in supraorbital region; labials yellowish

brown; brown lines radiating from eye; tympanum light, below dirty brownish yellow, with indications of darker spots or reticulations.

Measurements of Gonyocephalus semperi (Peters).

| | mm. |
|--------------------|-----|
| Total length | 228 |
| Snout to vent | 88 |
| Tail (tip missing) | 140 |
| Snout to foreleg | 36 |
| Axilla to groin | 41 |
| Width of head | 19 |
| Length of head | 29 |
| Foreleg | 51 |
| Hind leg | 83 |

Variation.—There are five other specimens in my collection from Bunawan, Agusan, and two from Mindoro. Of the Mindoro specimens one was collected by myself at San Teodoro, on the northern coast; the second was collected by Mr. Clark Burks at Sumagui, Mindoro. The Bunawan specimens are females and, with a single exception, all have very distinct lines of enlarged scales, one on either side of dorsal crest; on the largest specimen (100 millimeters from snout to vent), the rows of enlarged scales are dim or wanting on the anterior part; a small knob on the posterior part of orbit is prominent, and the two bony spines in occipital region are more prominent. One specimen has the rostral broken into three equal parts; the upper and lower labials vary between ten and thirteen. The hind legs in the different specimens always reach beyond the eye, but only in the one described does it reach the tip of the snout. Much of the coloring is lost after they are preserved, but the black nuchal collar followed by a light yellowish brown stripe is usually prominent; the brown transverse bars on legs, tail, and digits are usually discernible. The two specimens from Mindoro have the nasal in contact with the first labial and separated from the rostral by a single scale; the median scales on the snout are larger and arranged in a Y-shaped formation. The markings are similar to those of the Mindanao specimens.

Remarks.—No male of this species is at hand for study. Apparently the species does not differ greatly from *G. interruptus* Boulenger. The type specimen was collected by Semper in the Philippines in 1858–1866; the exact locality is no longer known. Known from Mindanao and Mindoro.

GONYOCEPHALUS SOPHIÆ (Gray)

PLATE 9, FIG. 2

Tiaris bellii (non Duméril and Bibron) GRAY, Cat. Liz. (1845) 239.

Tiaris sophiæ GRAY, Cat. Liz. (1845) 240.

Tiaris petersii GÜNTHER, Zool. Rec. 4: 136.

Tiaris sophiæ GÜNTHER, Proc. Zool. Soc. London (1872) 593, pl. 37, fig. C.; F. MÜLLER, III. Nachtr. Cat. Herp. Samml. Basel. Mus. (1883) 23.

Gonyocephalus sophiæ BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 288; TAYLOR, Philip. Journ. Sci § D 12 (1917) 371.

Description of species.—(From No. R117, Bureau of Science collection; collected in Negros, by C. S. Banks.) (Adult female.) Snout as long as diameter of eye, not sloping gradually from top of orbit to end of snout, but sloping rather abruptly to above nostril, then continuing parallel to line of mouth; superciliary ridge and canthus rostralis (which is confluent with it) projecting; tympanum distinctly smaller than eye opening, its distance from orbit equal to that of nostril from orbit; height of head at eye equal to distance from center of eye to end of snout; rostral well developed, larger than labials, bordered behind by four regular scales, the median largest; separated from rostral by a single scale, nasal fairly large with nostril pierced through its center; a row of somewhat prominent scales below and behind orbit, with a short row extending from orbit to above tympanum; orbital scales very small, those on supraocular region largest and strongly keeled; supraorbital region delineated by two curving rows of strongly keeled scales; an inverted Y-shaped series of scales on snout, quite distinct; a few distinctly enlarged scales between eye and upper part of tympanum; abdominal scales strongly keeled; a few slightly enlarged keeled scales behind and on angle of jaw, not prominent. Nine upper labials with a row of slightly enlarged scales above them, largest anterior to orbit; a row of scales bordering orbit below rather trihedral; only three rows of scales between upper labials and orbit; mental small; ten and eleven lower labials; two diverging series of chin shields, only the first pair touching rostral or labials and in contact; scales on chin and throat small, the median longitudinal series slightly enlarged, all strongly keeled; gular sac small, appearing as a slight fold on neck; nuchal and dorsal crests continuous, formed of lanceolate spines with smaller spiny scales along sides of crest; height of crest on neck nearly equal to length of snout; dorsal crest gradually diminishing in size, but

still present at base of tail; anteriorly, the nuchal crest reaches forward to a vertical, halfway between eye and tympanum; dorsal scales very small, feebly keeled, pointing upward and backward; a few irregularly scattered enlarged scales on sides; ventral scales large, strongly keeled; scales on legs very irregular but for the most part enlarged; scales under tail large and strongly keeled; limbs strong; hind leg brought forward reaches nostril or beyond; third and fourth fingers equal; lamellæ under toes strongly keeled; tail keeled and slightly compressed.

Color in alcohol.—Above yellowish brown, body and neck crossed by four broad, darker brown lines which reach low on sides; the two median bars broadest and three body bars rather coalescing on sides; brown bars spotted with darker brown, and a few darker spots on the light interspaces; head brown with a brown spot in occipital region and a few scattered brown spots on lips; chin with numerous brown spots forming indistinct, curved, longitudinal lines; tail barred with rings of dark brown separated by similar rings of light yellow-brown; limbs and digits barred with darker brown.

Measurements of Gonyocephalus sophiæ (Gray).

| | mm. |
|----------------------|-----|
| Total length | 155 |
| Snout to vent | 105 |
| Tail, part missing | 50 |
| Length of head | 32 |
| Depth of head | 19 |
| Supraocular width | 18 |
| Snout to foreleg | 46 |
| Axilla to groin | 46 |
| Diameter of eye | 8 |
| Diameter of tympanum | 5 |
| Foreleg | 58 |
| Hind leg | 89 |

Remarks.—The only specimen of this species examined is the one here described. It is an adult female containing two undeveloped eggs. The six specimens listed by Boulenger, including the type, were collected by Cuming. The exact locality is no longer known. F. Müller listed specimens from Mindanao. Known only from Negros and Mindanao.

GONYOCEPHALUS INTERRUPTUS Boulenger

PLATE 9, FIG. 1

Gonyocephalus interruptus BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 290, pl. 21; BOETTGER, Ber. Senck. Nat. Ges. (1886) 98.

Tiaris subcristata (non Blyth) FISCHER, Jahrb. wiss. Anst. Hamburg 2 (1885) 80.

Description of type.—(From Boulenger.) “Snout as long as the diameter of the orbit; canthus rostralis and supraciliary edge projecting; tympanum smaller than the eye-opening; upper head-scales small, keeled, slightly enlarged on the supraorbital region; scattered conical scales on the back of the head and on the temple; ten or eleven upper and eleven or thirteen lower labials. Gular sac small, without serrated anterior edge; gular scales strongly keeled, smaller than ventrals, intermixed with a few enlarged ones on the sides. Nuchal crest formed of lanceolate spines with smaller keeled ones at the base; its height equals two thirds the length of the snout; dorsal crest not continuous with, and lower than, the nuchal, gradually decreasing in height. Dorsal scales very small, smooth or indistinctly keeled, with the points directed upwards and backwards; enlarged scales on the flanks, forming irregular vertical series; numerous small tubercles on the nape; ventral scales of moderate size, keeled. Limbs with unequal keeled scales; third and fourth fingers equal; the adpressed hind limb reaches the nostril. Tail strongly compressed, with slightly serrated upper edge; caudal scales all keeled, largest inferiorly; length of the tail twice that of head and body.”

Color.—“Pale olive above, the enlarged tubercles and two cross bands, one on the nape, the other between the shoulders, whitish; tail with regular dark-brown annuli; limbs with rather indistinct dark cross bands; throat with very indistinct dark lines.”

Measurements of Gonyocephalus interruptus Boulenger.

| | mm. |
|---------------|-----|
| Total length | 280 |
| Head | 29 |
| Width of head | 22 |
| Body | 66 |
| Foreleg | 53 |
| Hind leg | 85 |
| Tail | 185 |

Remarks.—The type of this species was collected in Mindanao and presented to the British Museum by G. Taylor.

The differences between this form and *Gonyocephalus semperi* do not appear to be very marked. The specimens which I obtained in Mindanao were referred to *G. semperi* on the character of the row of scales parallel to the dorsal crest. Among them is one in which most of the scales of this row are missing but it agrees in most, even minute, details with the other forms. Peters's description is very meager. I am convinced that the variations in the skull will be eventually used in differentiating these species.

Genus **CALOTES** Cuvier

Calotes CUVIER, Reg. Anim. 2: 35; BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 314.

"Tympanum distinct. Body compressed, covered with equal-sized scales. A dorso-nuchal crest. A more or less developed gular sac in the male; no transverse gular fold, or a very feebly marked one. Tail round or feebly compressed. No femoral or præanal pores." (*Boulenger.*)

There are two species * of *Calotes* known in the Philippines.

Key to the Philippine species of Calotes Cuvier.

- α^1 . Males, dorsal crest strongly developed.... *C. marmoratus* (Gray) (p. 136).
 α^2 . Males, dorsal crest low..... *C. cristatellus* (Kuhl) (p. 139).

The genus is distributed over southeastern Asia and the Malay Archipelago.

Species of the genus *Calotes* are capable of changing color rapidly. I have frequently observed brilliant green specimens of *Calotes cristatellus* on tree trunks or on the earth which when observed would fade gradually to a dull gray or dark brown color becoming practically invisible if at some distance, so nearly do they merge into the color of their environment.

CALOTES MARMORATUS (Gray)

PLATE 11, FIG. 2

Bronchocela marmorata GRAY, Cat. Liz. (1845) 242.

Calotes (Bronchocela) philippinus PETERS, Mon. Berl. Ak. (1867) 16.

Bronchocela marmorata GÜNTHER, Proc. Zool. Soc. London (1873) 168.

Calotes marmoratus BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 318.

Two forms appear to merit subspecific distinction.

Key to the subspecies of Calotes marmoratus (Gray).

- α^1 . Gular pouch moderately developed.... *C. m. marmoratus* (Gray) (p. 136).
 α^2 . Gular pouch strongly developed..... *C. m. sanchezi* subsp. nov. (p. 138).

CALOTES MARMORATUS MARMORATUS (Gray)

Description of subspecies.—(From No. 169, Bureau of Science collection; collected at Banaue, Mountain Province, by H. Otley Beyer.) (Adult male.) Rostral small, rectangular, surrounded by six scales, separated from nostril by three scales; upper head scales moderate, strongly keeled, uniform; canthus rostralis formed by larger shingled scales, forming a projecting edge; curved row of enlarged scales outlining the supraocular regions

* I believe that Casto de Elera's record of *Calotes ophimachus* Merrem for the Philippines is an error.

on the top of head, separated from each other by four scale rows; occipital scales small and spiny; nostril pierced in a craterlike nasal which is separated from the second labial by a single scale; eight and nine upper labials; a few temporal scales slightly enlarged; tympanum large, superficial, its diameter as large as eye opening; mental larger than rostral, separating the first pair of chin shields; seven and nine lower labials; gular pouch well developed, the row of scales on its lower part forming a strongly serrated edge; seventy-eight rows of scales around body, the upper lateral scales larger than the lower; scales on belly largest, all scales strongly keeled; a strong crest beginning on the occipital region continues dorsally to above tail, gradually diminishing in size, formed by about forty lanceolate spines directed backward; the keels on the six upper scale rows on side of neck point upward and backward; only the row joining the dorsal crest on the body points upward and backward, the others point backward or backward and downward; scales on legs more or less enlarged; legs well developed, the third and fourth digits on foreleg of equal or nearly equal length; the foreleg adpressed backward reaches the groin; fourth toe on hind leg longer than third; the hind leg brought forward reaches the anterior corner of orbit; body and tail compressed, somewhat triangular in cross section; the keels on tail scales form continuous lines.

Color in alcohol.—Dull greenish blue, reticulated or diagonally striped with light brown; a large brown area on side behind foreleg; tail lavender; head dimly reticulated like body; belly uniformly lavender.

Measurements of Calotes marmoratus marmoratus (Gray).

| | mm. |
|----------------------------------|-----|
| Total length | 550 |
| Snout to vent | 125 |
| Tail | 425 |
| Length of head | 40 |
| Width of head between eyes | 19 |
| Depth of head posterior to orbit | 21 |
| Foreleg | 72 |
| Hind leg | 118 |
| Diameter of orbit | 12 |
| Tympanum from orbit | 8 |

Variation.—A very great deal of variation occurs in this species. There are four other specimens in the Bureau of Science collection from Banaue, Mountain Province. In all of these the nuchal and dorsal crests are differentiated, the spines

of the nuchal crest being narrower and more elongate than those of the dorsal. There are eleven spines in the nuchal crest in the males. The single female specimen in the lot has a high nuchal crest composed of eight spines; the dorsal crest is lower than in the males. An adult male specimen from Camarines has the high nuchal crest composed of nine spines followed by a low serrate dorsal crest; the nostril is smaller and more posterior than in other specimens examined. There are sixty-five scale rows around the body. The body (in alcohol) is bluish lavender with dim brown spots or dots, the last half of tail is very light gray without annulations. The number of scale rows around the middle of the body varies between fifty and seventy-five in the specimens examined.

Remarks.—The species is distributed over Luzon, Mindoro, Negros, and Panay. I question whether it is to be found in Mindanao where it seems to be replaced by a variety of *Calotes cristatellus*. The eggs of this species are spindle-shaped; two eggs are laid at one time.

CALOTES MARMORATUS SANCHEZI subsp. nov.

PLATE 11, FIG. 1

Type.—No. 827, Bureau of Science collection; collected on Polillo Island by C. Canonizado.

Description of type.—The subspecies differs from *C. m. marmoratus* in the presence of a very distinct gular pouch; the nasal scale and nostril are larger; the hind leg extends nearly halfway between the eye and nostril; the nuchal crest is composed of ten narrow lanceolate spines; the dorsal crest is low, serrate.

Color in formalin.—Deep brown above with very dim lighter reticulations; dim dark spots below tympanum and on sides of neck; chin and gular pouch cream without spots; a light brown edged spot behind the insertion of the hind leg extending on base of tail and on posterior aspect of femur.

Measurements of Calotes marmoratus sanchezi subsp. nov.

| | mm. |
|----------------------------|-----|
| Snout to vent | 95 |
| Tail mutilated | 90 |
| Foreleg | 54 |
| Hind leg | 85 |
| Length of head | 30 |
| Width of head between eyes | 15 |

Variation.—Two other specimens, an adult female and a young, in the Bureau of Science collection, are from the same locality. The female has no gular pouch. The nuchal crest is nearly as high as that of the male and consists of eleven spines. The latter specimen has been preserved in alcohol. The color is light grayish blue heavily reticulated with spots and lines of black-brown, those on sides of neck nearly black; the belly scales are densely powdered with brown as are the scales on the underside of neck, limbs, and base of tail. The tail is broken off but the extremity of the remaining part is light brown with frequent dense brown spots; the light spot is present behind the insertion of the hind leg. The young specimen resembles the female specimen.

Remarks.—The subspecies is known only from Polillo. The subspecies is named for Rev. Francisco de P. Sanchez, S. J., of the Ateneo de Manila.

CALOTES CRISTATELLUS (Kuhl)

Agama cristatella KÜHL, Beitr. Zool. Vergl. Anat. 108.

Calotes cristatellus FITZINGER, Neue Class. Rept. 49.

Agama moluccana LESSON, Voy. Coquille, Rept. pl. 1, fig. 2.

Calotes gutturosa GUÉRIN, Icon. Req. Anim., Rept. pl. 7, fig. 3.

Bronchocela cristatella KAUP, Isis (1827) 619; DUMÉRIL and BIBRON, Erp. Gén. 4 (1837) 395; CANTOR, Cat. Mal. Rept. (1847) 30; GIRARD, U. S. Expl. Exped., Herp. (1858) 411; GÜNTHER, Rept. Brit. India (1864) 138; PETERS, Mon. Berl. Ak. (1867) 17; STEINDACHNER, Novara, Rept. (1869) 27.

Bronchocela moluccana PETERS, Mon. Berl. Ak. (1868) 17.

Bronchocela burmana BLANFORD, Journ. As. Soc. Bengal 48 (1878) 127.

Calotes cristatellus BOULENGER, Cat. Liz. Brit. Mus. 1 (1885) 316; TAYLOR, Philip. Journ. Sci. § D 13 (1918) 264.

Description of species.—(From No. 815, Bureau of Science collection; collected on Busuanga, Calamianes, 1918, by E. H. Taylor.) Rostral small, surrounded by five scales; nostril in moderate nasal which is separated from rostral by two scales; nine upper labials; upper head scales rather small, more or less uniform; canthus rostralis distinct, formed by shingled scales; slightly projecting; scales delineating supraorbital region enlarged and strongly keeled; a few small compressed scales behind superciliary edge; gular pouch moderately developed; tympanum about the size of eye opening, superficial; mental larger than rostral; eight lower labials; scales on occiput small, strongly keeled; a nuchal crest consisting of eight scales begins on

posterior part of occiput; dorsal crest very low, but distinctly separated from nuchal crest; scales on body strongly keeled; the keels on the eight upper rows form broken lines pointing upward and backward; scales in sixty-eight rows around body; scales on belly largest; a more or less distinct depression on neck behind tympanum; foreleg brought back reaches to groin; the adpressed foreleg reaches to nostril; body and base of tail broadly triangular in cross section.

Color in life.—Bright yellow-green above, darker green on head and neck; the body crossed by nine or ten dim whitish bars made up of more or less rounded spots, each alternate bar more distinct; belly and underside of chin and throat greenish yellow or greenish white; tail dimly barred with darker at base; end of tail gray.

Measurements of Calotes cristatellus (Kuhl).

| | mm. |
|----------------|-----|
| Total length | 425 |
| Snout to vent | 104 |
| Tail | 321 |
| Length of head | 30 |
| Foreleg | 55 |
| Hind leg | 90 |

Variation.—The size of the lateral scales varies considerably. Boulenger gives the range of scale rows as fifty-seven to ninety-seven. The arrangement and disposition of the nuchal and dorsal scales vary considerably. Certain Palawan specimens have a much higher nuchal crest than the one described, and the dorsal crest is likewise higher. There is a distinct break between the two crests.

Several specimens in my own collection from Mindanao have the spines forming the nuchal crests strongly overlapping at the base and curving strongly backward, not making a serrated crest.

Remarks.—With larger collections it will doubtless be possible to separate out more than one form worthy of subspecific rank. I do not regard my treatment here as wholly satisfactory. In the Philippines this form is found in Palawan, Calamianes, Cagayan Sulu, Mindanao, and the Sulu Archipelago. Boulenger lists a specimen from Dinagat.

Genus HYDROSAURUS Kaup

Hydrosaurus KAUP, Isis (1828) 1147.

Lophura GRAY, Phil. Mag. 2 (1827) 36; WAGLER, Syst. Amph. (1830)

- 151; WIEGMANN, *Herp. Mex.* (1834) 14; FITZINGER, *Syst. Rept.* (1843) 49; GRAY, *Cat. Liz.* (1845) 247.
Istiurus CUVIER, *Reg. Anim.* ed. 2 2: 41.
Istiurus, part., DUMÉRIL and BIBRON, *Erp. Gén.* 4 (1837) 376.

Tympanum distinct. Body strongly compressed with a large fanlike crest on basal part of tail; a dorsal crest of lanceolate spines; throat longitudinally plicate, with numerous skin folds on sides of neck and shoulder; a transverse gular fold; toes with lateral fringe of enlarged scales; tail strongly compressed; femoral pores present.

This genus is distributed throughout the East Indies. The species deposit eggs usually along the banks of streams. They are vegetarians and eat the leaves of plants, and even feed in trees growing along streams and rivers. They are largely aquatic and can run across the surface of water with ease. They frequently dive and can remain under water more than a minute.

The flesh is prized as food by many of the Philippine peoples. It is variously known as *ibid* (Visayan); *balubid* (Tagalog), *hunianggo* (Ilocano).

HYDROSAURUS PUSTULOSUS (Eschscholtz)

- Histiurus pustulatus* ESCHSCHOLTZ, *Zool. Atlas.* (1829) pl. 7.
Lophura pustulata WIEGMANN, *Nova Acta Acad. Caes.-Leop. Carol.* I 17 (1835) 207.
Lophura amboinensis GÜNTHER, *Proc. Zool. Soc. London* (1873) 168; BOULENGER, *Cat. Liz. Brit. Mus.* 1 (1885) 402 (part.); PARENTI and PICAGLIA, *Atti. Soc. Nat. Modena, Mem. Orig.* III 5 (1886) 18.

Description of species.—(From No. 1416, Bureau of Science collection; collected on Polillo, October, 1909, by C. Canonizado.) Head moderately large; snout longer than diameter of orbit; snout rapidly elevated with a strong nasal crest beginning behind rostral; latter moderately large, broader than high, bordered laterally by first labials, behind by five small scales; nasal crest composed of four or five compressed scales with enlarged scales at their base; nostril in a single raised nasal followed by a groove, behind and below which are two or three much-enlarged scales; canthus rostralis moderately distinct, continuous with superciliary border, formed of larger compressed scales; eleven and twelve upper labials, bordered above by a row of slightly smaller scales, these separated from other frenal scales by a fairly straight depressed line; subocular scales in a straight line; head scales strongly keeled, small, fairly uniform, with a large white pineal "eye-spot;" a few enlarged tubercular

scales in temporal region; tympanum large, its diameter more than two-thirds that of eye; a row of enlarged scales above and extending somewhat back of tympanum; mental large, triangular, followed by two diverging series of chin shields, only the first pair of which is in contact; first two pairs in contact with labials, eleven scales in each series; nine and ten lower labials; scales on chin very irregular in size with seven or eight enlarged tubercles on throat below angle of jaw; gular pouch quite large; a strong fold in front of shoulder; scales on sides of neck minute, with four or five very large, conical tubercles arranged in a longitudinal row; on upper part of each side of body a series of groups of enlarged scales, six or seven groups to base of tail, which form a row parallel with dorsal crest; dorsal crest begins above tympanum and continues to base of tail, and is composed of numerous lanceolate spines, sixty in all; nuchal and dorsal crests continuous but spines somewhat smaller above shoulder; none of the spines as high as diameter of orbit; caudal crest with sawlike edge higher than tail at base, extending about one-fourth the length of tail; about twenty-two scales in a vertical row on widest part of caudal fan; scales on back small, keeled, the keels directed upward and backward; scales near dorsal crest largest; scales on breast in front of insertion of arms greatly enlarged; numerous enlarged scattered scales low on sides, continuing somewhat on abdomen; belly scales numerous, more or less regularly arranged in transverse rows, and the ends of scales notched somewhat; a series of femoral pores, fourteen or fifteen on each side, in single broken rows, separated medially; scales under tail very strongly keeled, the keels forming continuous lines; limbs well developed, the anterior reaching a little beyond snout, the posterior reaching to about eye; scales on limbs strongly keeled, those on anterior aspect of upper arm and thigh much enlarged; third and fourth fingers equal; fourth toe much longer than third; digits of arm with slight lateral fringes, equally wide on each side; toes with broad lateral fringes; that on outer side of toes widest; composed of thirty-five transversely widened scales on fourth toe; about same number of scales on inner fringe but these are very much smaller; claws strong.

Color in life.—Olive to greenish slate, spotted or reticulated with black; tail brownish with irregular lighter areas; belly greenish slate to yellowish; head brownish, labials and chin bluish slate.

Measurements of Hydrosaurus pustulosus (Eschscholtz).

| | mm. |
|--------------------|-----|
| Total length | 897 |
| Snout to vent | 255 |
| Tail | 642 |
| Snout to foreleg | 98 |
| Axilla to groin | 118 |
| Length of head | 62 |
| Width of head | 36 |
| Foreleg | 128 |
| Hind leg | 210 |
| Height of tail fan | 35 |

Variation.—A female from the same locality differs from the male in having a lower caudal fan and a higher nasal crest. A lateral fold from axilla to groin is much more prominent than in the male, which is a smaller specimen; there are twelve femoral pores on each side.

Of the two specimens in my collection from Mindoro, one has the body scales about a third larger and, instead of sixty-four scales (as in the Polillo specimen) from dorsal crest to the axilla-to-groin fold, there are only about forty-eight in the widest part; the row of groups of enlarged scales is present and an additional row of single scales is present between this and the crest; there is a very distinct break in the dorsal crest above the shoulder which is filled with very small lanceolate scales; the enlarged scales on the outer edges of the abdomen are much more numerous than in the described specimen; the enlarged scales above the labials are broken up into rows of small scales; temporal scales are enlarged and are strongly compressed and keeled; the diverging series of chin shields are separated from each other and do not touch any labials; no definite groups of scales are present on neck below the angle of the jaws; seventeen femoral pores present on each side; the pores are larger in the Polillo specimens; the lanceolate spines on the caudal fan are more prominent. The second specimen from Mindoro represented by a mutilated skin has the nasal crest wanting but the dorsal lepidosis resembles the other Mindoro specimen. Two young Negros specimens are in the collection, and a single one from Mindanao.

Remarks.—This species is regarded by Barbour as differing from *Lophura amboinensis* Schlosser. I have no extra-Philippine material for comparison, but have followed his conclusions.

The Philippine forms may be advantageously divided into subspecies when larger series have been obtained.

I did not find it in Sulu but probably it occurs there on the larger islands. The species is known from Luzon, Polillo, Mindoro, Negros, Dinagat, and Mindanao.

VARANIDÆ

Varanidæ COPE, Proc. Acad. Nat. Sci. Philadelphia (1864); BOULENGER, Cat. Liz. Brit. Mus. 2 (1885) 303.

"Tongue smooth, very long and slender, forked, retractile into a sheath at the base. Teeth large, dilated at the base, which is fixed to the inner side of the jaws; palate toothless. Præmaxillary single, narrowed and much prolonged posteriorly. Nasal bones coalesced, narrow; two frontals; a single parietal; a supraorbital bone; postorbital arch incomplete; a bony postfrontosquamosal arch; pterygoids and palatines widely separated; infraorbital fossa bounded by the pterygoid, palatine, and transverse bone, the maxillary being excluded. No dermal cranial ossifications; head covered with small polygonal scales. Eyelids well developed; ear-opening distinct. Limbs well developed; clavicle slender; interclavicle anchor-shaped. Dorsal scales roundish, juxtaposed, surrounded by rings of minute granules; ventral scales squarish, arranged in cross rows. No femoral or præanal pores. Tail very long." (*Boulenger.*)

A single genus, confined to Eurasia, Africa, and Australia. About thirty species are known.

Genus *VARANUS* Merrem

Tupinambis, part., DAUDIN, Rept. 3 (1802) 5.

Varanus MERREM, Tent. Syst. Amph. (1820) 58; DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 467; GRAY, Cat. Liz. (1845) 9; GÜNTHER, Rept. Brit. India (1864) 64; BOULENGER, Cat. Liz. Brit. Mus. 2 (1885) 304.

Psammosaurus FITZINGER, Neue Class. Rept. (1826) 50; WAGLER, Syst. Amph. (1830) 165.

?*Hydrosaurus* GÜNTHER, Rept. Brit. India (1864) 64.

?*Polydædalus* WAGLER, Syst. Amph. (1830) 165.

Monitor SCHLEGEL, Abbild. Amph. (1844) 65; PETERS, Mon. Berl. Ak. (1870) 106.

Characters of the genus are the same as those of the family.

The species of this genus of large lizards are among the most striking specimens of the Philippine reptile group. They attain a larger size than any other Philippine lizard, not in-

frequently reaching 2 meters or more in length. There are five known species in the Philippines, the largest being *Varanus salvator*. They occur in all the larger islands and probably in most of the smaller ones.

In habits they do not differ greatly from other lizards. The eggs are laid in tree trunks or in the hollow roots of stumps, usually near water. They dive readily and swim beneath the surface of the water. They can climb trees. Their food is varied. Seemingly they prefer rotting animal flesh, and will even eat the flesh from human cadavers which are buried in shallow graves or are placed among the rocks for burial. Some species eat beetles and grasshoppers and any other food they can obtain such as small bugs, animals, or even eggs. They readily catch and eat domestic chickens.

They are known in the Islands under a variety of names, among which are *bayawak* (Tagalog), *bañas* (Ilocano), *halo* (Visayan), *guibang* (Butuan Visayan and Manobo). Not infrequently they are called "iguanas," but they certainly are not iguanas. They are widely known among English-speaking people as monitors.

In many parts of the Islands they are eaten. In some parts certain internal organs of the reptile are used as medicine. A Manobo considers it a calamity for one to enter his house. In most countries where they occur they are considered poisonous, but this belief is a fallacy.

Key to the Philippine species of Varanus Merrem.

*a*¹. Nostril an oblique slit; tail compressed and keeled above; abdominal scales keeled.

*b*¹. Nostril equally distant from orbit and end of snout.

V. grayi Boulenger (p. 145).

*b*². Nostril nearer orbit than end of snout; snout long and pointed; nuchal scales extremely large and strongly keeled.

V. rudicollis (Gray) (p. 146).

*a*². Nostril oval, at least twice as far from orbit as from end of snout; tail compressed and keeled above.

*b*¹. Nuchal scales not larger than dorsals. *V. salvator* (Laurenti) (p. 147).

*b*². Nuchal scales larger than occipitals and dorsals.

V. nuchalis (Günther) (p. 150).

*b*³. Nuchal scales smaller than occipitals, larger than dorsals.

V. cumingi Martin (p. 151).

VARANUS GRAYI Boulenger

Varanus ornatus (non Daudin) GRAY, Cat. Liz. (1845) 10.

Varanus grayi BOULENGER, Cat. Liz. Brit. Mus. 2 (1885) 312.

Description of type.—(From Boulenger.) “Snout pointed, depressed at the end, slightly shorter than the distance from the anterior corner of the eye to the anterior border of the ear; canthus rostralis distinct. Nostril oblique, equally distant from the orbit and the end of the snout. Digits long. Tail strongly compressed, keeled above. Scales of head moderate, larger than those on the temples, those between the orbits largest; no transversely dilated supraocular scales. The nine anterior rows of nuchal scales nearly as large as the head-scales, as broad as long, smooth; the following become gradually smaller and elongate; dorsal scales small, oval, strongly keeled. Scales on upper face of limbs strongly keeled. Abdominal scales keeled, in a hundred transverse rows. Caudal scales keeled; the caudal keel with a very low, doubly-toothed crest. Greenish anteriorly, with broad blackish bands across the upper face of the neck and back, these bands darkest at their borders; hinder part of back, tail and hind limbs olive-brown, dotted with greenish; a few blackish spots on the upper surface of the head, and a blackish temporal streak commencing from the eye.”

Measurements of Varanus grayi Boulenger.

| | mm. |
|--------------|-----|
| Total length | 546 |
| Head length | 46 |
| Neck | 50 |
| Body length | 130 |
| Foreleg | 79 |
| Hind leg | 105 |
| Tail | 320 |

Remarks.—The type, in the British Museum, was collected by H. Cuming in 1836–1840 and has no more exact locality than “Philippines.” No other specimen has been recorded.

VARANUS RUDICOLLIS (Gray)

Uranus rudicollis GRAY, Cat. Liz. (1845) 10.

Varanus rudicollis BOULENGER, Cat. Liz. Brit Mus. 2 (1885) 313.

Description of species.—(From Boulenger.) “Teeth acute, compressed. Snout pointed, very long, considerably longer than the distance from the anterior corner of the eye and the ear; canthus rostralis swollen. Nostril an oblique slit, its distance from the tip of the snout twice and a half that from the orbit. Digits elongate. Tail compressed, keeled above. Scales of head moderate, subequal; supraocular scales with a posterior central series of three to six transversely dilated scales. Scales

on upper surface of neck extremely large and prominent, strongly keeled, forming ten to twelve longitudinal series; they become gradually smaller as they pass into the dorsal region; latter and limbs with small, strongly-keeled scales. Abdominal scales keeled, in 85 transverse series. Caudal scales keeled; the caudal keel with a very low, doubly-toothed crest. Blackish above, neck and anterior part of body yellowish, the former with three black longitudinal streaks, the latter with two broad transverse black bands; hinder part of back and flanks with yellowish ocelli; limbs with small yellowish spots; lower surfaces obscured by black reticulations."

Measurements of Varanus rudicollis (Gray).

| | mm. |
|---------------|-----|
| Total length | 840 |
| Head length | 90 |
| Neck length | 110 |
| Body length | 240 |
| Foreleg | 170 |
| Hind leg | 200 |
| Tail, injured | 400 |

Remarks.—The type locality is "Philippines," the exact locality no longer known. Known also from Borneo and Malay Peninsula. The type specimen was collected by H. Cuming, 1836–1840, and is in the British Museum. Evidently this species and *Varanus grayi* are rare or are confined to some particular island. So far as I know, no specimen other than the type has been collected in the Philippines.

VARANUS SALVATOR (Laurenti)

PLATE 23

- Stellio salvator* LAURENTI, Syn. Rept. (1768) 56.
Tupinambus bivittatus KUHL, Beitr. Zool. Vergl. Anat. (1820) 125.
Monitor elegans GRAY, Zool. Journ. 3 (1828) 225.
Varanus vittatus LESSON, in Bélanger. Voy. Ind. Or., Rept. 307.
Hydrosaurus bivittatus WAGNER, Syst. Amph. (1830) 164.
Hydrosaurus marmoratus WIEGMANN, Nova Acta Acad. Caes.-Leop. Carol. I 17 (1835) 196, pl. 14.
Varanus bivittatus DUMÉRIL and BIBRON, Erp. Gén. 3 (1836) 487.
Varanus salvator CANTOR, Cat. Mal. Rept. (1847) 29.
Hydrosaurus salvator GRAY, Cat. Liz. (1845) 13.
Monitor bivittatus SCHLEGEL, Abbild. (1844) 76, pls. 21, 22, figs. 1, 2;
 MÜLLER and SCHLEGEL, Verh. Natur. Gesch. Nederl. ov. Bezitt., Rept. (1874) 38.
Hydrosaurus salvator GÜNTHER, Rept. Brit. India (1864) 67, pl. 9, fig. E.

Varanus salvator BOULENGER, Cat. Liz. Brit. Mus. 2 (1885) 314; BOETTGER, Ber. Senck. Nat. Ges. (1886) 100; BARBOUR, Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 88; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 146.

Description of species.—(No. 1605, Bureau of Science collection.) Snout moderately long, rather depressed at end; distance of nostril to end of snout twice that from nostril to eye; diameter of tympanum equals distance from nostril to tip of snout; above nostrils two distinctly raised areas with a distinct groove between; scales on snout rather small, juxtaposed; nostrils longitudinally oval, separated from mouth by four rows of scales, and from small rostral by five; a more or less distinct line or groove from base of nostril to eye sharply delineating the frenal from the supralabial region; three or four scale rows on latter in front of eye, two below eye; four rows of frenal scales; two rows of scales from anterior corner of eye border orbit below, the outer row larger, composed of rectangular scales; twenty-nine labial scales bordering upper lip, and a similar number bordering lower lip; temporal region nearly vertical; fifteen rows of small scales in temporal region; four or five enlarged transverse supraocular scales, rather broken, separated from superciliary region by two scale rows; twelve superciliaries; five scale rows between supraocular regions; parietal scales rather enlarged, sixteen scales in a line across occiput; nuchal scales enlarged, not or but slightly larger than dorsals, arranged in about sixteen to eighteen rows; scales above small, oval, keeled; below small, regular, keeled or smooth, arranged in transverse rows, about seventy rows from axilla to groin; about the same number of scales in the transverse rows; digits moderate, scales below digits small, arranged in transverse series, about twenty-eight under longest toe; a row of rounded tubercles along lower margin on basal half of fourth toe on side next third toe, and a shorter series on third toe; scales on bottom of foot small, rounded.

Color in life.—Above deep black with five transverse rows of yellow ocelli, about five in each row; traces of two yellow bars present on snout; a yellow ring about tympanum, and a narrow line behind; scattered yellow scales on limbs; tail barred with yellow above; below, belly yellow, with traces of eleven black bars from neck to groin; throat yellow, with a few black spots; tail not barred below.

Measurements of Varanus salvator (Laurenti).

| | mm. |
|------------------|-----|
| Total length | 960 |
| Tail | 570 |
| Snout to vent | 390 |
| Axilla to groin | 180 |
| Snout to foreleg | 165 |
| Width of head | 38 |
| Length of head | 83 |
| Foreleg | 130 |
| Hind leg | 174 |

Variation.—The variation in this species is not marked. There is a slight difference in the number of labials, and in the number of scales in a line across the neck and the occiput. On some specimens the tubercles on the outer side of the third toe are wanting.

The color pattern varies greatly. Some specimens show only series of large ocelli on a black ground; others have the number of ocelli reduced and there is much yellow mixed throughout the black over the entire dorsal part of the body. The number of transverse rows of scales on the belly varies between seventy-five and ninety. The persistence of the black transverse bars on belly varies considerably with age. Older specimens are entirely yellow, or show only a trace of markings. In young specimens the markings are more pronounced than in older specimens and the bars on the belly are never especially prominent and do not join in the middle; the edges of many of the scales are yellowish, and the ocelli are not prominent; the tail is distinctly barred.

Remarks.—This species is the largest of the genus, specimens attaining a length of more than 2 meters; they are frequently seen especially along rivers and swamps and seem to be semi-aquatic in their habits. They are, at least for the most part, carnivorous and eat any flesh they can obtain, and will attack any animal they think they can kill; carrion is eaten with relish; eggs are deposited in rotting logs or stumps. The species is widely distributed and is known from China, southern Asia, Ceylon, Java, Sumatra, Borneo, and Celebes.

It was first reported from the Philippines by Wiegmann, in 1835, from specimens probably collected by Meyen; it is known from Mindanao, Mindoro, Palawan, and Luzon.

VARANUS NUCHALIS (Günther)

PLATE 10, FIG. 1

Hydrosaurus nuchalis GÜNTHER, Proc. Zool. Soc. London (1872) 145, pl. 8; (1873) 165.

Hydrosaurus marmoratus (non Wiegmann) GÜNTHER, Proc. Zool. Soc. London (1873) 165.

Varanus nuchalis BOULENGER, Cat. Liz. Brit. Mus. 2 (1885) 315; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 371.

Description of species.—(From No. 1511, Bureau of Science collection.) Teeth acute, compressed. Snout slightly depressed at tip, with slight elevations above nostrils, and a slight groove between elevations; rostral small, pentagonal, larger than adjacent labials; separated from nostril by six scales; scales on head usually irregularly pentagonal; two scales border rostral behind; eight scale rows between nostrils; latter longitudinally oval, the distance between nostril and end of snout contained more than twice in distance of nostril to eye; six transversely elongated scales in supraocular region, separated from superciliary edge by three rows of small scales; supraocular groups separated from each other by seven rows of very unequal scales; occipital region level, temporal regions vertical to it; a rather prominent temporal angle; about twenty scale rows across occipital region; temporal scales small, equal, sixteen or seventeen rows from angle of mouth to temporal-occipital edge; about thirty labials border edge of both jaws; nostril separated from labials by three scale rows; frenal region depressed; a noticeable groove behind nostril delineates the frenal region, which is separated from labials by two rows of somewhat enlarged scales; mental larger than rostral; a prominent longitudinal groove on chin beginning shortly behind mental; tympanum large, superficial, its diameter slightly smaller than length of eye; scales on neck large, scattered, larger than scales on back or occipital region; about eight rows on neck between an imaginary line drawn backward from occipito-temporal edge; scales separated from each other by areas of skin covered with minute granules; keels on nuchal scales sometimes evident; scales on back and tail strongly keeled; a prominent skin fold on neck; scales on belly elongate, arranged in regular transverse rows, about seventy-eight rows from axilla to groin, some of the scales with slight keels; scales on tail arranged in transverse rows,

those below much enlarged and very strongly keeled; limbs large, armed with strong claws; third finger longer than fourth; fourth toe much the longest; scales under digits tubercular, arranged in transverse rows; a few enlarged tubercles on inner side of fourth finger and toe, and a few on outer side of third.

Color in life.—Above black, with a few scattered yellow spots on limbs and tail; head uniformly dark, the sides a shade of dark brown; a yellow spot on point of chin; belly yellowish, with traces of numerous black bars; these do not meet medially; tail lighter below.

Measurements of Varanus nuchalis (Günther).

| | mm. |
|---------------------|-------|
| Total length | 1,050 |
| Snout to vent | 500 |
| Tail (part missing) | 550 |
| Snout to foreleg | 200 |
| Snout to eye | 44 |
| Snout to ear | 81 |
| Axilla to groin | 225 |
| Foreleg | 157 |
| Hind leg | 196 |
| Length of head | 95 |
| Width of head | 45 |

Remarks.—Very little variation is evident. This species apparently does not attain as large a size as *Varanus salvator*, to which species it is most nearly allied. Its food consists of crabs, insects, slugs, decaying flesh, birds, small mammals, and small reptiles. The species is regarded as edible by some Filipinos and does not differ from *V. salvator* in flavor.

It is known from Mindoro, Negros, and Luzon, and probably occurs on various other islands. The specimen described is from Dumaguete, Negros.

VARANUS CUMINGI Martin

PLATE 10, FIG. 2

Varanus cumingi MARTIN, Proc. Zool. Soc. London (1838) 69.

Hydrosaurus cumingii GÜNTHER, Proc. Zool. Soc. London (1872) 145, pl. 7.

Varanus cumingii BOULENGER, Cat. Liz. Brit. Mus. 2 (1885) 316.

Description of species.—(From No. 346, E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, July, 1913, by

E. H. Taylor.) Head elongate, nostril rounded, much nearer end of snout than eye; distance of nostril to end of snout less than half the distance of snout to eye; rostral scale very small, scarcely larger than the adjacent labials, a little higher than wide; scales on snout small, pentagonal, fairly regular; nine scales surround nostril; nine scales between nostrils; a few transversely elongate scales, which do not extend to superciliary edge, in the supraocular region which is only slightly raised; two rather prominent raised areas above nostrils; about fourteen scales on superciliary edge; nostril separated from labials by three scale rows; a curved row of very slightly enlarged scales below orbit, which are separated from labials by a single row of scales; thirty-two small upper labials; scales in temporal region very small, regular, arranged in about fifteen rows; scales in occipital region very irregular, the (pineal) "eye-spot" usually prominent; tympanum large, its diameter about four-fifths eye; mental about size of rostral, followed by a distinct groove; lower labials as numerous as upper, of about same size; scales on dorsal surface of neck smaller than occipital scales, not keeled, somewhat larger than those on back, arranged in twenty or more rows; an indistinct skin fold from tympanum to shoulder, and a fold on throat; latter with minute scales; belly with scales elongate, arranged in definite transverse bands, about seventy rows from axilla to groin and about an equal number of scales in the widest rows; limbs strong, well developed; anterior brought forward reaches anterior border of orbit, posterior reaches axilla; third and fourth fingers equal; fourth toe longest with numerous rows of small rounded tubercles below; a row of enlarged tubercles on fourth toe near base, on side next third toe; scales on anterior aspect of thigh much larger than those on posterior; tail compressed with a slight indication of a caudal crest; scales underneath tail strongly keeled; scales on belly, sides, and back very slightly keeled.

Color in life.—Above deep black with numerous small yellow spots, usually arranged in transverse rows, with numerous, scattered, yellow scales; tail barred with yellow bands, much narrower than the black intervening bands; neck more yellowish than black; a distinct black stripe from eye to above ear; black spots or lines on neck; head with irregular transverse dark bands, dimly visible on chin and throat; belly and neck crossed with very numerous, irregular, dark lines, separated by yellow lines of nearly the same width.

Measurements of Varanus cumingi Martin.

| | mm. |
|------------------|-----|
| Total length | 520 |
| Snout to vent | 205 |
| Tail | 315 |
| Snout to eye | 23 |
| Snout to foreleg | 84 |
| Axilla to groin | 87 |
| Foreleg | 66 |
| Hind leg | 86 |
| Length of head | 39 |
| Width of head | 22 |

Variation.—The measurements given are for the largest specimen of the seven in my collection. The smallest specimen has a total length of 305 millimeters. All agree fairly well in markings and color. Sometimes the yellow spots are larger with black centers, the legs dotted with yellow, and the digits barred with yellow; three specimens have an area in the occipital region filled with minute scales similar to Günther's figure.

Remarks.—Whether this species grows to a size as large as the other Philippine forms I cannot say, but I do not believe it reaches the size of *V. salvator* or *V. nuchalis*. This species is common in Mindanao; it has not been found in other islands.

SCINCIDÆ

Scincidæ, part., GRAY, Ann. Phil. II 10 (1825) 201; BOULENGER, Ann. & Mag. Nat. Hist. V 14 (1884) 120; Cat. Liz. Brit. Mus. 3 (1887) 130.

"Tongue moderately long, free and feebly nicked in front, covered with imbricate scale-like papillæ. Dentition pleurodont; teeth conical, bicuspid, or with sphæroidal or compressed crowns; the new teeth hollow out the base of the old ones. Pterygoid teeth may be present.

"Praemaxillary bones two, sometimes incompletely separated; nasal double; frontal single or double; parietal single; post-orbital and postfrontotemporal arches complete, osseous; inter-orbital septum and columella cranii well developed; infraorbital fossa present, bounded by the maxillary, the transverse bone, the palatine, and often also by the pterygoid. Skull with bony dermal plates over-roofing the supratemporal fossa.

"Limbs present or absent; pectoral and pelvic arches constantly present. Clavicle dilated and usually perforated proximally; interclavicle cruciform. Ossified abdominal ribs are absent.

"Body protected by bony plates underlying the scales, which are cycloid-hexagonal, rarely rhomboidal, imbricate, arranged quincuncially. These plates provided with symmetrical tubules, which usually consist of a transverse one anastomosing with several longitudinal ones. Head covered with symmetrical shields; an azygos occipital is rarely present. Pupil round. Eyelids well developed. No femoral pores." (*Boulenger.*)

This is the largest family of the Sauria; it is cosmopolitan in distribution. The various species are adapted to many modes of life; some are arboreal, some terrestrial, some subterrestrial, and some semiaquatic. Many are oviparous, but most of them are ovoviviparous. These characteristics are of little more than specific value. Certain members of a genus may produce eggs which are incubated wholly outside the body, and others bring forth living young. This is shown in two closely related species of *Mabuya*; *M. multicarinata* lays eggs, whereas *M. multifasciata* brings forth living young. The same condition obtains in two Philippine species of *Leiopisma*; *L. pulchellum* is oviparous, and *L. semperi* gives birth to living young.

Another character which ordinarily merits generic distinction fails in this group. This is the degree of development of the legs and digits. A very notable example is the Philippine genus of *Brachymeles*. Here we find a complete retrogression from the pentadactyl species with moderately developed limbs to small burrowing species with no external vestiges of legs. Thus we have pentadactyl and tetradactyl forms; species having small legs and no digits, and finally one species with no legs. The same retrogression is paralleled in the genus *Lygosoma* Gray (non Boulenger).

Many species of the Scincidæ are very small. In certain instances these small ones agree so closely with one another in the scalation of the head and in markings that it is almost impossible to define them so they may be recognized as different species. This is especially true of certain small ones belonging to the genus *Sphenomorphus*. A difficulty encountered in the study of the Philippine skinks is that considerable variation occurs in the same species in coloration and scalation, especially in those found on various island groups. In some cases I have resorted to trinomial nomenclature to record these apparently constant variations. There are eleven genera in the Philippines.

Key to the Philippine genera of the Scincidæ.

- α^1 . Palatine bones in contact on the median line of the palate; tympanum either superficial, deeply sunk, or covered.

- b*¹. Pterygoid bones separated on the median line of the palate, the palatal notch extending anteriorly to an imaginary line connecting the center of the eyes; supranasals present; lateral teeth conical.
Mabuya Fitzinger (p. 155).
- b*². Pterygoid bones in contact (at least quite anteriorly) to between the center of the eyes.
- c*¹. Supranasals usually present; wanting in *Dasia smaragdinum*.
- d*¹. Limbs well developed, pentadactyl.
- e*¹. Lower eyelid scaly.
- f*¹. A pair of enlarged preanals..... *Otosaurus* Gray (p. 163).
- f*². No enlarged preanals..... *Dasia* Gray (p. 200).
- e*². Lower eyelid with transparent disk..... *Emoia* Gray (p. 223).
- d*². Limbs short or rudimentary; lower eyelid scaly or with disk; preanals sometimes present..... *Riopa* Gray (p. 230).
- c*². Supranasals absent.
- d*¹. Lower eyelid scaly.
- e*¹. Limbs well developed, pentadactyl.
- f*¹. Tympanum more or less deeply sunk.
Sphenomorphus Fitzinger (p. 166).
- f*². Tympanum superficial.
Tropidophorus Duméril and Bibron (p. 234).
- e*². Limbs short, rudimentary or absent; prefrontals small and widely separated..... *Lygosoma* Gray (p. 233).
- d*². Lower eyelid with a transparent disk.
- e*¹. Frontoparietal divided (Philippine species).
Leiolopisma Duméril and Bibron (p. 208).
- e*². Frontoparietal single (some species have scaly eyelids).
Siaphos Gray (p. 216).
- α*². Palatine bones separated on the median line; supranasal shields present; nostril pierced in a very small nasal or between 2 or 3 scales; a postnasal present or absent; limbs short, rudimentary or wanting..... *Brachymeles* Duméril and Bibron (p. 243).

Genus MABUYA Fitzinger

Mabuya FITZINGER, Neue Class. Rept. (1826) 23.

Spondylurus FITZINGER, Neue Class. Rept. (1826) 23.

Euprepis WAGLER, Nat. Syst. Amph. (1830) 161, part.

Euprepes WIEGMANN, Herp. Mex. (1834) 36.

Mabouya GRAY, Cat. Liz. (1845) 93.

Mabuia COPE, Proc. Acad. Nat. Sci. Philadelphia (1862) 185; BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 150.

Palatine bones in contact medially; palatal notch separating entirely the pterygoids, extending forward to between centers of eyes; pterygoid teeth minute or absent; maxillary teeth conical or bicuspid; eyelids movable; ear distinct; tympanum more or less deeply sunk; nostril pierced in a single nasal; supranasals, prefrontals, and frontoparietals present; single or double interparietal usually distinct, sometimes coalesced with the parietals; limbs well developed, pentadactyl; digits subcylindrical or com-

pressed, with transverse lamellæ beneath. Widely distributed in Africa, Asia, East Indies, Central America, South America, and West Indies.

There are three Philippine species of this genus.

Key to the Philippine species of Mabuya Fitzinger.

α^1 . No postnasal; scales quinquecarinate or septemcarinate; ear opening without projecting lobules; scales rows, 28 to 30; hind leg adpressed reaches elbow..... *M. multicarinata* (Gray) (p. 156).

α^2 . A postnasal.

b^1 . Scales tricarinate or quinquecarinate; scale rows, 32 to 36 around body; hind leg adpressed does not reach axilla.

M. multifasciata Kuhl (p. 158).

b^2 . Scales tricarinate; scale rows, 30 to 32; hind leg adpressed reaches axilla or beyond..... *M. rudis* (Boulenger) (p. 161).

The first two species listed are extremely common forms, and are known from one end of the Islands to the other. Both are found in Borneo, while the second also has a wide distribution in Asia. The first is oviparous, the second is ovoviviparous, as many as ten young being born at a time. I am uncertain whether the third lays eggs or not.

The third species, *M. rudis*, has only recently been discovered in the southern part of the Sulu Archipelago.

MABUYA MULTICARINATA (Gray)

PLATE 12, FIG. 2

Tiliqua multicarinata GRAY, Cat. Liz. (1845) 109; GÜNTHER, Proc. Zool. Soc. London (1879) 76.

Mabuia multicarinata BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 185, pl. 11, fig. 2; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 161.

Eumeces carinatus (var.) PETERS, Preuss. Exped. O. Asien, Zool. Teil, 1 (1876) 376.

Mabuya multicarinata TAYLOR, Philip. Journ. Sci. § D 13 (1918) 247.

Description of species.—(From No. 987, E. H. Taylor collection; collected at Isabela, Negros, by E. H. Taylor.) Habit lacertiform, the head rather wedge-shaped, the supraocular region not or but slightly raised; rostral moderate, forming a narrow suture with frontonasal; suture with labial anterior to nostril; supranasals present, long, narrow, not in contact; frontonasal longer than broad, separated from nasal, touching a single frenal and forming a narrow suture with frontal; prefrontals well developed, separated, in contact with two frenals, first superciliary and first two supraoculars; frontal longer than broad, narrower than supraocular region, its widest part anterior to eye, in contact with second supraocular only; frontoparietals double, small, each touching three supraoculars; interparietal

very small, the parietals forming a suture behind it; parietals small, transversely elongate, more than twice as broad as long, followed by a single pair of nuchals; four supraoculars, second widest and longest; nasal elongate, nostril pierced near its center; no postnasal; two frenals; first higher than second, second longer than first; two preoculars between fourth labial and first superciliary; five superciliaries; lower preocular followed by a small scale above fifth labial; lower eyelid scaly; temporals not or but slightly enlarged; eight upper labials, that below eye large, entering orbit broadly; ear opening moderate with minute anterior lobules; mental larger than rostral; a large postmental touching two lower labials; seven lower labials; two pairs of chin shields, only first pair in contact; scales on head slightly rugose or striated; twenty-eight scale rows around body, all save ten ventral rows strongly quinquecarinate or septemcari-

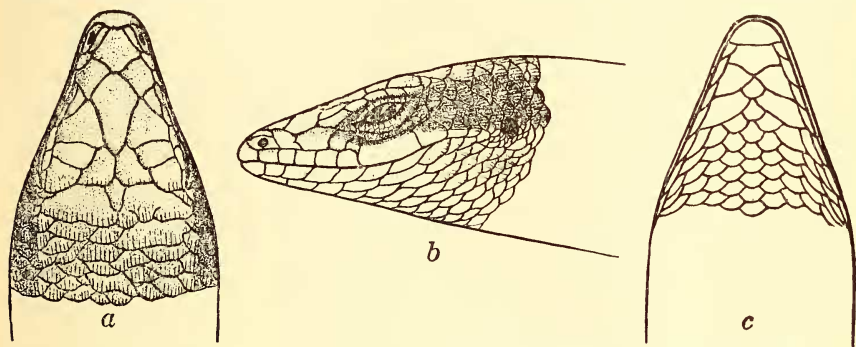


FIG. 13. *Mabuya multicarinata* (Gray); a, head, dorsal view; b, head, lateral view; c, chin; $\times 2$.

nate, some of the scales on neck even novemcarinate; scales above and below tail somewhat broadened transversely; limbs well developed; the anterior brought forward reaches nostril; hind leg brought forward barely reaches axilla; digits strong, fourth finger slightly longer than third; fourth toe much longer than third with twenty-six smooth lamellæ below; anus bordered anteriorly by four slightly enlarged scales; ear nearer foreleg than end of snout.

Color in life.—Above brilliant, iridescent olive green with irregular series of dark spots dorsally; head and neck rather brownish; a broad, brown, lateral stripe from eye to hind leg with indications of darker and lighter markings; below this stripe olive greenish with a few whitish ocelli; below, belly bluish green; tail marked like back with darker and lighter spots; labials cream with darker sutures; chin creamy white; palms yellowish; lamellæ of digits black.

Measurements of Mabuya multicarinata (Gray).

| | mm. |
|------------------|------|
| Total length | 220 |
| Snout to vent | 75 |
| Tail | 145 |
| Snout to foreleg | 27.5 |
| Axilla to groin | 35 |
| Foreleg | 27 |
| Hind leg | 37 |

Variation.—Many specimens have only four instead of five small labials anterior to the large subocular; the scale rows vary from twenty-eight to thirty-two. A certain amount of variation in coloration is evident. Frequently there is a lighter line above the broad, lateral, brown stripe, and occasionally there is a trace of a median lighter line; not infrequently, especially in younger specimens, the light stripe of upper labials continues back to groin as a stripe below the broad, lateral, brown band. A young specimen found in the mountains near Baguio by my wife, Hazel Clark Taylor, shows a striking variation in markings. This specimen has three distinct creamy white markings down the middle of the back, none of which borders the brown lateral stripe. This may represent a distinct species.

Remarks.—Skinks of this species are extremely common in the Philippines wherever there is forest. In places they are incredibly numerous, especially along roadways or sunny, open spots in a forest. They do not take to cover when disturbed, but continue running in various directions, which habit makes them difficult to capture. They lay eggs, usually in leaves or under the bark of fallen logs. They are for the most part terrestrial but ascend small trees and brush in search of insects. They are known in the Philippines as *tabili*, *tambuli*, *tambilihan*, *bubuli*, etc. Most Filipino peoples do not differentiate them from other skinks of this and other genera.

The species is widely distributed throughout the Achipelago, as is *Mabuya multifasciata*. It has been reported from the Babuyan Islands, north of Luzon, and I have taken specimens in Bongao Island in the southern part of the Sulu Archipelago. It has been taken on practically all the larger intervening islands and in Palawan. It was noted that southern specimens usually averaged two to four scale rows more than the northern specimens. Known also from Borneo.

MABUYA MULTIFASCIATA Kuhl

Mabuya multifasciata KUHL, Beitr. Zool. Vergl. Anat. (1820) 126.

Scincus carinatus, part., SCHNEIDER, Hist. Amph. 2 (1801) 183.

Lacerta rufescens, part., SHAW, Zoology 3: 285.

- Mabuya multifasciata* FITZINGER, Neue Class. Rept. (1826) 52.
Tiliqua rubriventris GRAY, Ill. Ind. Zool. 2 (1830-34) pl. 75, fig. 1.
Tiliqua rufescens, part., GRAY, Cat. Liz. (1845) 109.
Euprepes sebæ, part., DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 692.
Euprepis rufescens CANTOR, Cat. Mal. Rept. (1843) 46.
Euprepes sebæ GRAVENHORST, Nova Acta Acad. Leop.-Carol. I 23 (1851) 332, pl. 33.
Euprepes carinatus GRAVENHORST, Nova Acta Acad. Leop.-Carol. I 23 (1851) 338; BOCOURT, Miss. Sc. Mex. Rept. pl. 22 c, fig. 5.
Plestiodon sikkimensis GRAY, Ann. & Mag. Nat. Hist. II 12 (1853) 388.
Tiliqua rufescens GIRARD, U. S. Explor. Exped., Herp. (1858) 227.
Euprepes rufescens, part., GÜNTHER, Rept. Brit. India (1864) 79.
Tiliqua carinata, part., STOLICZKA, Journ. As. Soc. Bengal 39 (1870) 169.
Euprepes carinatus, part., THEOBALD, Cat. Rept. Brit. India (1876) 49.
Euprepes ocellatus BOCOURT, Ann. Sc. Nat. VI 7 (1878) art. 16, 414, pl. 22 c, fig. 8.
Mabuia multifasciata BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 186; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 112, fig. 69.
Mabuia multifasciata lateripunctata F. MÜLLER, III. Nacht. Cat. Herp. Samml. Basel. Mus. (1883) 21.
Mabuya multifasciata BARBOUR, Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 89; TAYLOR, Philip Journ. Sci. § D 12 (1917) 371; § D 13 (1918) 246.

Description of species.—(From No. 443, E. H. Taylor collection; collected in Occidental Negros, by E. H. Taylor.) (Female.) Snout short, head and neck not distinct from each other;

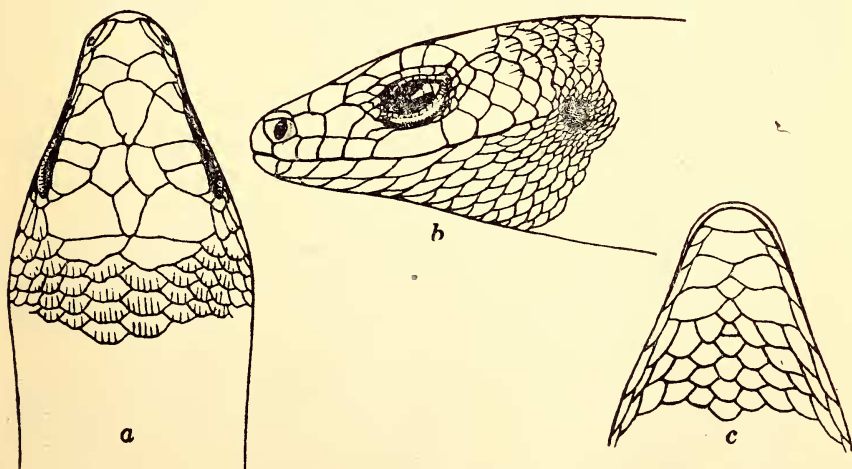


FIG. 14. *Mabuya multifasciata* Kuhl; a, head, dorsal view; b, head, lateral view; c, chin: $\times 2$.

rostral small, supranasals meeting behind it, separating it from frontonasal; latter much broader than long, in contact with first frenal; prefrontals very large, broadly in contact; frontal small, not or barely in contact with first supraocular, broadly in contact

with second, separated from third; four supraoculars (three on left side), second widest and longest; frontoparietals elongate, distinct; interparietal small, parietals not forming a suture behind it; a pair of nuchals present; nostril large, pierced in posterior part of nasal; a small postnasal; two frenals longer than high; six elongate superciliaries; several enlarged temporals, the largest not bordering parietal; seven upper labials, fifth below eye; mental narrow; an azygos postmental, and two paired chin shields; thirty-two scales around middle of body, the dorsals with three to five sharply defined keels; laterals smooth or keeled; ventral scales smooth; preanals no larger than other ventral scales; limbs strong, twenty lamellæ under fourth toe; scales under tail not widened except under regenerated part; adpressed hind leg reaches elbow of foreleg; ear opening small, with anterior lobules, nearer foreleg than end of snout; lower eyelid scaly.

Color in life.—Above brown with a slight olive wash, and slightly iridescent; the five median scale rows edged with black on their sides which gives the appearance of five indistinct stripes of black; laterally much darker, with greenish to milky white quadrangular spots or ocelli; below bluish green; labial sutures edged with black. Tail with dark spots or lines above with a black lateral stripe; ocelli continued on tail.

Measurements of Mabuya multifasciata Kuhl.

| | mm. |
|-------------------|-----|
| Total length | 295 |
| Snout to vent | 123 |
| Tail, regenerated | 175 |
| Snout to foreleg | 46 |
| Axilla to groin | 59 |
| Foreleg | 38 |
| Hind leg | 54 |

Variation.—Males are bluish to olive green, uniformly colored, or with a large, lateral orange or yellow spot usually present during the breeding season, and in certain specimens during the entire year.

The Negros specimens, of which an adult female is described, are apparently larger and longer than those occurring in other localities. The largest two specimens measure 131 and 134 millimeters from snout to vent; the total length of the first is 317 millimeters; in the second the tail is broken. The scale rows vary between thirty-two and thirty-four. Large series are present in my collection from Mindanao, Mindoro, and Manila; in the Bureau of Science collection there is a good series from

Sulu, Palawan, and Luzon. Of more than sixty specimens examined none is as large as any of the six specimens in the Negros collection.

The number of scales varies from thirty to thirty-six. The relation of the internasals varies; in many specimens they are in contact, but in the larger number they are separated.

Remarks.—The species is an extremely common one, though it probably does not occur with as great frequency as does *M. multicaudata*. The females give birth to from five to ten young at a time. One female from Negros contains ten embryos. These lizards feed largely on crickets and other similar insects. Many of them occupy burrows. Known from all the large islands, and they probably occur on most of the smaller ones.

MABUYA RUDIS (Boulenger)

PLATE 12, FIG. 1

Mabuia rudis BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 188, pl. 11, fig. 3; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 161.

Mabuia levisi BARTLETT, Croc. Liz. Borneo (1895) 93.

Mabuya rudis TAYLOR, Philip. Journ. Sci. § D 13 (1918) 247.

Description of species.—(From No. 344, Bureau of Science collection; collected on Papahag Island, by E. H. Taylor.)

Rostral rather small, wider than high, well visible above, slightly in contact with frontonasal; supranasals present, small, elongate, not in contact; frontonasal slightly broader than deep, in contact with frontal behind; prefrontals rather large, separated, touching the first and second supraoculars; frontal narrow, elongate, not as wide as supraocular region, much longer than distance to end of snout, and longer than parietal region; frontoparietals distinct, rather elongate, longer than interparietal; parietals wider than long, not forming a suture behind interparietal; a pair of large nuchals; four supraoculars, the first is much

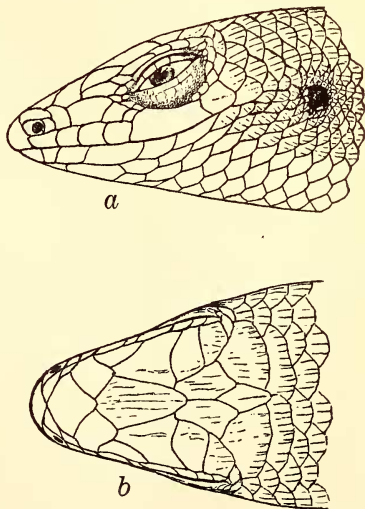


FIG. 15. *Mabuya rudis* (Boulenger), from Sulu; a, head, lateral view; b, head, dorsal view; $\times 2$.

reduced, not touching frontal; second large, the only supraocular touching frontal; nostril in a rectangular nasal, pierced behind the vertical of suture of rostral and first labial; a postnasal; two

frenals, the anterior much higher than nasal, much smaller than second; two preoculars between first superciliary and fourth labial, superior small; four labials anterior to large subocular; six lower labials, first small, third much elongate; mental narrow, followed by a postmental and two pairs of divided chin shields, first pair in contact; temporals not or but slightly enlarged; six superciliaries, first and third much the largest; lower eyelid scaly; ear moderate, tympanum deeply sunk, lobules projecting; scales in thirty rows around body, all keeled, except the ten ventrals; head scales somewhat rugose; legs well developed; adpressed hind limb reaches slightly beyond shoulder; fourth toe much longer than third with twenty unicarinate lamellæ below; anals not or but slightly enlarged; tail long, somewhat compressed, tapering very suddenly behind anus; eye nearer ear than end of snout; ear much nearer foreleg than end of snout.

Color in life.—Above, head and body dark brown with some scales flecked with black; below, throat and chin bluish, with black flecks; belly yellowish with blackish spots on many of the scales; underside of legs and base of tail grayish brown.

Measurements of Mabuya rudis (Boulenger).

| | mm. |
|------------------|-----|
| Total length | 229 |
| Snout to vent | 93 |
| Snout to foreleg | 34 |
| Tail | 136 |
| Axilla to groin | 44 |
| Width of head | 15 |
| Length of head | 22 |
| Foreleg | 35 |
| Hind leg | 50 |

Variation.—Two other specimens have been examined; an adult from Tawitawi and a young example from Papahag. The first specimen does not differ from the one described, save that the black spots on the back form continuous lines and that there is a bright orange band along the side (greenish in alcohol); the throat is bluish with indistinct bluish longitudinal lines; the labials have black spots, and the tail is flecked with white. The young specimen is olive green, with a broad black stripe beginning behind the eye; the sides of neck and body are greenish, and below it is greenish white. De Rooij* states that the scale rows range between thirty and thirty-six.

* Loc. cit.

Remarks.—This species was first observed on Bitinan, a small island north of Jolo, Sulu Archipelago. It was also observed on Jolo and on most of the southern islands visited by me. The first specimen was taken on Tawitawi. It appears to be very common but is extremely difficult to capture. It does not replace either of the other species of *Mabuya*, *M. multicarinata* or *M. multifasciata*, since the three apparently occur with the same frequency on the islands from Bitinan to Sibutu Channel. I did not observe any of the three species on the Sibutu group between Sibutu and Alice Channels, but I suspect they are present there, since all three are known to occur in Borneo.

Many of the specimens seen had the anterior part of the body a bright russet to orange color; in others the orange color was present low on the sides of the body.

It is extremely elusive, and specimens shot with an air rifle usually managed to escape. Unlike *M. multicarinata*, but similar to *M. multifasciata*, it takes refuge in holes in the ground which are probably burrows made by it.

It occurs in Sumatra, Java, Borneo, and Celebes. In the Philippines it is known only from the Sulu Archipelago and Zamboanga.

Genus OTOSAURUS Gray

Otosaurus GRAY, Cat. Liz. (1845) 93.

Lygosoma sec. *Otosaurus* BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 201.

Parotosaurus BOULENGER, Trans. Zool. Soc. London 20 (1914) 257.

Legs well developed, pentadactyl. Lower eyelid scaly. Ear opening large, without auricular lobules. Supranasals present. Frontal not broader than supraocular region. Frontoparietals distinct. Enlarged preanals.

Otosaurus cumingii Gray, the only species of the genus that is known from the Philippines, is the largest skink found in the Islands.

OTOSAURUS CUMINGII Gray

PLATE 13, FIG. 2

Otosaurus cumingii GRAY, Cat. Liz. (1845) 93.

Euprepes otus PETERS, Mon. Berl. Ak. (1867) 20.

Otosaurus cumingii GÜNTHER, Proc. Zool. Soc. London (1879) 76;

F. MÜLLER, III. Nacht. Cat. Herp. Samml. Basel. Mus. (1883) 21.

Lygosoma cumingii BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 209, pl. 16, fig. 2.

Description of species.—(From No. 861, E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, August, 1912, by E. H. Taylor.) Rostral about as broad as deep, the sides narrowing much in front of first labial; supranasals elongate,

large, forming a distinct suture, equal to about one-half their width; frontonasal small, as wide as long, separated from rostral and frenals, in contact with frontal; prefrontals large, separated, touching both frenals laterally; frontal large, as wide as supraocular region, longer than its distance from snout and longer than the combined parietal length, touching four supraoculars; seven or eight supraoculars, the last two small, first narrowly in contact with prefrontal; frontoparietals separate, longer than wide; interparietal small, longer than wide, the parietals forming a suture behind it; no nuchals; nostril large, in a single nasal; latter followed by two frenals of the same height, the second very much the broader; two preoculars, the lower largest; twelve or thirteen superciliaries, the first very much enlarged, narrowly separated from frontal; eight upper labials, fifth, sixth, and seventh below orbit and separated from

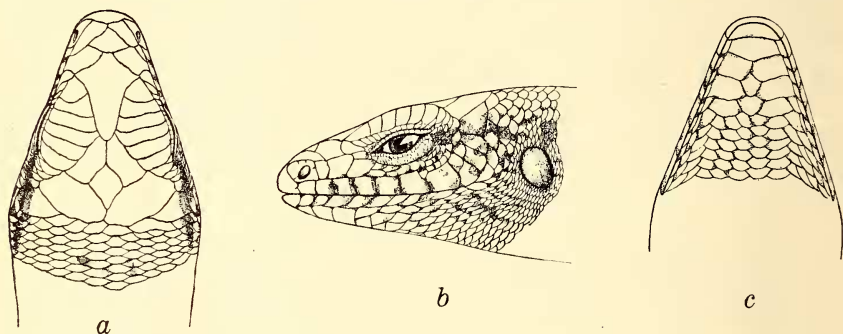


FIG. 16. *Otosaurus cumingii* Gray; a, head, dorsal view; b, head, lateral view; c, chin; $\times 2$.

it by two or three rows of small scales; temporals enlarged, the largest bordering parietal; eight or nine lower labials; mental small, transversely elongate, much smaller than rostral, followed by a narrow postmental, one conjoined pair and two separated pairs of chin shields, all wider than deep, the third pair separated from labials; fifty-two scale rows around body, dorsals largest; two slightly enlarged preanals; distance from snout to forelimb less than axilla-to-groin distance; adpressed hind limb reaches shoulder or slightly beyond; limbs strong, fourth finger and fourth toe longest; twenty-five bicarinate lamellæ under fourth toe; length of tail nearly one and one-half times distance from snout to vent; eye nearer end of snout than ear opening; latter large, nearly equaling eye; no auricular lobules; tympanum superficial; lower eyelid scaly.

Color in life.—Yellowish to reddish brown, lighter on head and neck, with a double series of irregular blackish spots which

persist as dim, irregular, transverse bars on posterior part of body and tail; a series of ten or eleven large blackish spots begins behind ear and continues to near groin; the spots merge together or are separated only by narrow bluish white lines; below this row the color is broken and reticulated with darker; a short, broken, dark line from eye to above ear; tail barred or mottled with dark; undersurfaces brownish yellow.

Measurements of Otosaurus cumingii Gray.

| | mm. |
|------------------|-----|
| Total length | 333 |
| Snout to vent | 135 |
| Tail | 198 |
| Snout to foreleg | 48 |
| Axilla to groin | 66 |
| Width of head | 22 |
| Foreleg | 49 |
| Hind leg | 72 |

Variation.—Three or four localities are represented by the nine specimens in the collections studied; five are from Bunawan, Agusan. These agree with each other fairly well; however, the following variations are observable: Lower labials vary between ten and twelve; the superciliaries between twelve and fourteen; the scale rows between fifty and fifty-two. All, save the specimen described, have the prefrontal and supraocular separated; No. 863 (E. H. Taylor collection) is the largest, and measures 144 millimeters from snout to vent; this specimen is figured. The color on the belly is a dirty bluish yellow, the neck and throat bluish, with most of the scales edged with black. One specimen from Sumagui, Mindoro, varies from the described specimen as follows: The interparietal is very large, and the parietals form no suture; it has eight upper labials; fifty-two scale rows; and the prefrontal and supraocular are in contact. Two specimens from Limay, Bataan, Luzon, have sixteen to eighteen superciliaries and fifty-eight to sixty scale rows. The single specimen in the Bureau of Science collection (No. 1362, from Mindanao) has fifty-six scale rows.

The young usually have distinct vertical yellow bars on the side which divide the large black spots and terminate above in a larger yellow spot; the spots on the back are usually represented by dim bars. This condition exists also in certain adult specimens.

Remarks.—Boulenger states that the lamellæ are unicarinate; all the specimens examined have distinct bicarinate lamellæ. This is the largest Philippine skink and reaches a length of at

least 360 millimeters. When disturbed these skinks readily take refuge in holes in the ground; hence they are difficult to capture. They are common about the base of Mariveles in Bataan. Vogt* has reported a specimen of this species from Dutch New Guinea. De Rooij† has expressed a doubt as to its correct identification. Undoubtedly the differences recorded between the typical *O. cumingii* Gray and Vogt's specimen warrant the making of a new species for the reception of the latter.

The type of *O. cumingii* was discovered in the Philippines by H. Cuming, 1832–1836; the exact locality is now unknown. Known from Dinagat, Mindanao, Mindoro, and Bataan, Luzon.

Genus SPHENOMORPHUS Fitzinger

Sphenomorphus FITZINGER, Syst. Rept. (1843) 23; STEJNEGER, Bull. U. S. Nat. Mus. 58 (1907) 216.

Hinulia GRAY, Cat. Liz. (1845) 74.

Lygosoma (section *Hinulia*) BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 212.

Legs well developed, pentadactyl. Lower eyelid scaly. Tympanum distinct. No supranasals; the frontoparietal is single or divided. The length of hind leg usually exceeds the distance between center of eye and foreleg.

For a proper understanding of the Philippine skinks I prefer to recognize Boulenger's genus *Lygosoma* as a supergenus, and his various sections of the genus as genera. It is true that there is no strong dividing line between certain of these genera as, for instance, Boulenger‡ states that *Lygosoma decipiens* Boulenger and *Lygosoma luzonense* Boulenger connect sections *Hinulia* and *Homolepida*, but that both should be referred to the former. The distinction between *Siaphos* and *Leiolopisma* is rather slight, and *Siaphos kempi* Taylor might easily be regarded as a *Leiolopisma*. Stejneger§ has regarded *Otosaurus* Gray as belonging to the genus *Sphenomorphus* Fitzinger. I do not follow him in this. A careful study of *Otosaurus cumingii* Gray, the type of the genus, causes me to regard it as belonging to a separate genus. The presence of a large, well-defined supranasal does, I believe, separate it from *Sphenomorphus*.

The genus as here considered has sixteen known representatives in the Philippine fauna, besides three forms regarded as sub-

* Vogt, Sitz. Ges. Naturf. Fr. (1911) 417; (1912) 365.

† De Rooij, Rept. Indo-Aust. Arch. 1 (1915) 166.

‡ Proc. Zool. Soc. London (1894) 734.

§ Bull. U. S. Nat. Mus. 58 (1907) 216.

species. Many are rather local in distribution and doubtless many species remain undiscovered, especially in the northern part of Luzon, in Mindanao, and on high mountains. Most of these skinks are terrestrial in habit, although *Sphenomorphus arborens*, and to some extent *S. acutus* and *S. variegatus*, are exceptions in this respect. *Sphenomorphus fasciatus* is a burrowing form and is never seen except when disturbed under some log, rock, or plant. In consequence of this habitat the eye is reduced somewhat in size. Most of the species of *Sphenomorphus* are rather diminutive. The largest form is *S. jagorii* subsp. *grandis*; it reaches a length of more than 260 millimeters. *Sphenomorphus steerei*, *S. decipiens*, *S. luzonensis*, *S. atrigularis*, *S. biparietalis*, and *S. moellendorffi* probably never attain a length of 100 millimeters, and most of the individuals are much shorter.

Key to the Philippine species of Sphenomorphus Fitzinger.

*a*¹. Frontoparietal single.

*b*¹. Anterior frenals, 2, superimposed.*

*c*¹. Six supraoculars; 26 to 30 scale rows; 32 to 34 subdigital lamellæ; †
180 millimeters in length..... *S. acutus* (Peters) (p. 168).

*c*². Four supraoculars; 40 scale rows; 16 to 19 subdigital lamellæ on
longest toe; 98 millimeters in length.

S. curtirostris Taylor (p. 170).

*b*². Anterior frenal single.

*c*¹. Five supraoculars; 34 to 36 scale rows; 22 lamellæ; 166 millimeters
in length..... *S. coxi* Taylor (p. 173).

*c*². Four supraoculars.

*d*¹. Twenty-eight scale rows; hind leg equals distance between eye
and foreleg; 80 millimeters in length.

S. luzonensis (Boulenger) (p. 175).

*d*². Thirty-six scale rows; hind leg equals distance between nostril
and foreleg; 80 millimeters in length.

S. decipiens (Boulenger) (p. 176).

*d*³. Thirty to 34 scale rows; 10 lamellæ; 70 millimeters in length;
2 pairs of parietals..... *S. biparietalis* Taylor (p. 177).

*d*⁴. Thirty-two scale rows; 16 lamellæ; 90 millimeters in length.

S. moellendorffi (Boettger) (p. 179).

*d*⁵. Thirty scale rows; 12 lamellæ; 74 millimeters in length.

S. steerei Stejneger (p. 180).

*a*². Frontoparietal double.

*b*¹. Anterior frenals, 2, superimposed; 5 supraoculars.

*c*¹. Forty-two scale rows; 23 lamellæ; 148 millimeters in length.

S. llanosii Taylor (p. 182).

*c*². Thirty-eight to 40 scale rows; 20 to 25 smooth lamellæ; 139
millimeters in length..... *S. variegatus* (Peters) (p. 184).

*b*². Anterior frenal single.

* *Sphenomorphus steerei* and *S. curtirostris* vary in the condition of the anterior frenal. See descriptions.

† The count of subdigital lamellæ is for the fourth toe.

c¹. Four supraoculars.

d¹. Forty to 42 scale rows; 21 lamellæ; 168 millimeters in length.
S. arborens Taylor (p. 186).

d². Thirty scale rows; 10 lamellæ; 64 millimeters in length.
S. atrigularis Stejneger (p. 196).

c². Five supraoculars.

d¹. Twenty-eight scale rows; 22 lamellæ; 183 millimeters in length.
S. fasciatus (Gray) (p. 188).

d². Forty scale rows; 22 lamellæ; 114 millimeters in length.
S. lednickyi Taylor (p. 190).

d³. Thirty-eight to 44 scale rows; 23 lamellæ; 270 millimeters in length..... S. jagorii (Peters) * (p. 192).

d⁴. Thirty-two scale rows; 17 unicarinate lamellæ; 116 millimeters in length..... S. mindanensis Taylor (p. 198).

The arrangement of the species within the key is rather misleading as it brings together species that have nothing in common save the position and number of the frenals, and a similar condition of the frontoparietal. Thus the two forms *Sphenomorphus acutus* and *S. curtirostris* are probably least closely related.

Just what the actual relationship is among the species of this genus is largely a matter of conjecture. It appears that *S. acutus*, *S. atrigularis*, *S. fasciatus*, and *S. biparietalis* have no close relationship among the other Philippine species. It is not improbable that more than one species has been included under the name of *S. steerei*.

SPHENOMORPHUS ACUTUS (Peters)

PLATE 14, FIG. 2

Lygosoma (Hinulia) acutum PETERS, Mon. Berl. Ak. (1864) 54.

Hinulia acutum GÜNTHER, Proc. Zool. Soc. London (1879) 76.

Lygosoma acutum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 248.
BOETTGER, Ber. Senck. Nat. Ges. (1886) 100.

Description of species.—(From No. 500, E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, 1912, by E. H. Taylor.) Habit lacertiform, slender; head pointed; fronto-nasal very large, forming a suture with rostral but minutely separated from frontal; prefrontals large, barely in contact; bordered by three frenals laterally; no supranasal; frontal elongate, not or scarcely as wide as supraocular region, longer than distance to end of snout, less than the combined parietal length; six supraoculars, first the longest and in contact with prefrontal, third widest, first three touching frontal; frontopa-

* *Sphenomorphus jagorii* varies in the condition of the frontoparietal; it is single in *S. jagorii divergens* Taylor. See descriptions.

rietal single, much wider than long; interparietal longer than wide, rounded in front, pointed behind; parietals narrowly in contact behind interparietal; a pair of nuchals (scale on right side broken); nostril in a single nasal; latter followed by two superimposed frenals, the upper largest; these are followed by a low, elongate frenal three times as long as high, behind which are two superimposed frenals, the upper largest; three superimposed preoculars; ten or eleven superciliaries; nine upper labials separated from orbit by a row of scales; several enlarged temporal scales, the largest bordering parietal; five or six lower labials, all small, long, and narrow; mental smaller than rostral,

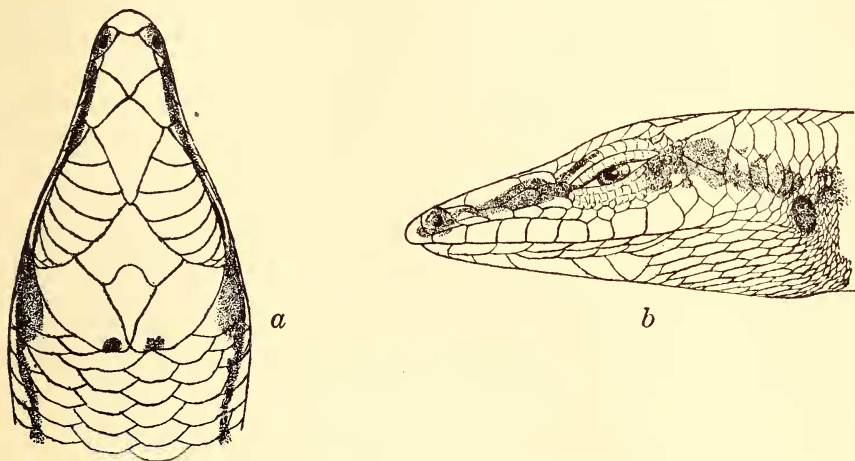


FIG. 17. *Sphenomorphus acutus* (Peters); a, head, dorsal view; b, head, lateral view; $\times 3$.

followed by two postmentals, the second of which is twice as large as first, and three paired chin shields; thirty rows of scales around body, the dorsals very much the largest, all perfectly smooth; on neck the median rows are transversely dilated and narrowed; two enlarged preanals; adpressed hind leg reaches shoulder; digits long and especially slender, compressed; fourth toe much the longest, with thirty-four smooth subdigital lamellæ; nearer ear opening than end of snout; ear opening smaller than eye opening, without lobules; scales under tail transversely elongate.

Color in life.—Above light brown with a median irregular series of black-brown spots that continue to the tail as irregular, broken, indistinct bars on tail; a black streak begins on nostril, continuing to above arm, where it breaks into irregular spots and continues to base of tail; chin, labials, throat, and belly immaculate.

Measurements of Sphenomorphus acutus (Peters).

| | mm. |
|------------------|------|
| Total length | 205 |
| Snout to vent | 69 |
| Tail | 136 |
| Width of head | 9 |
| Snout to foreleg | 26 |
| Axilla to groin | 31 |
| Foreleg | 24 |
| Hind leg | 36.5 |

Variation.—There are twenty-one specimens in my collection from the Agusan Valley, Mindanao. The number of scale rows varies from twenty-six to thirty; in practically all specimens save the one described the prefrontals form a strong suture. In the young the tails are pinkish.

Remarks.—This species is especially common about Bunawan and hundreds of specimens might easily have been obtained. Specimens usually feed on the ground about trees; when disturbed they take refuge on the nearest tree, which they ascend for a distance of one or more meters and then keep out of sight by running around the trunk keeping on the side of the bole opposite the pursuer; they rarely if ever ascend a tree any considerable distance. The species has also been taken in Dinagat and Samar. The type locality is "Loquilocun, auf der Insel Samar." The type was collected by F. Jagor, 1859–1861.

SPHENOMORPHUS CURTIROSTRIS Taylor

PLATE 14, FIG. 3

Sphenomorphus curtirostris TAYLOR, Philip. Journ. Sci. § D 10 (1915) 101.

Description of species.—(From No. R1695, Bureau of Science collection; collected at Bunawan, Agusan, Mindanao, September 8, 1912, by E. H. Taylor.) Head very short; diameter of eye about equal to distance from eye to end of snout; latter distance much less than that from eye to ear; ear midway between end of snout and insertion of foreleg; rostral twice as broad as high, forming a broad curved suture with frontonasal; latter about twice as wide as long, narrowly touching frontal; prefrontals large, wider than deep, narrowly separated; frontal diamond-shaped, in contact with two supraoculars and with first superciliary (on one side only), about as wide as supraocular region; frontoparietals fused into a single plate, not as long as frontal; parietals much longer than broad, forming a broad su-

ture behind interparietal, which is similar in shape but much smaller than frontal; no nuchals; four supraoculars; five on left side; nasal moderate, single, nostril pierced near its center; no supranasals; two anterior frenals, superimposed, the lower in contact with first and second labials; second frenal separated from labials by the large inferior preocular, superior preocular small; ten or eleven superciliaries; two rows of small scales separating labials from orbit; seven upper labials, third larger than fourth; two enlarged anterior temporals, the largest bordering parietal; mental broader than rostral followed by a single large postmental which is in contact laterally with two lower labials; three pairs of chin shields, first pair in contact, second wider than first pair; forty rows of scales around body, those on back and belly much larger than lateral scales; three enlarged preanal scales; anus some distance behind insertion

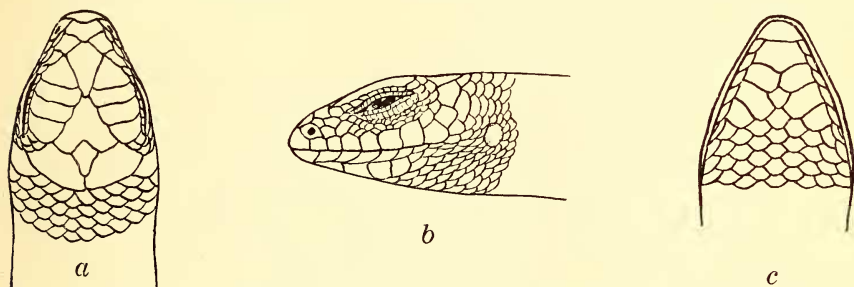


FIG. 18. *Sphenomorphus curtirostris* Taylor, from the type; a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

of hind legs; legs well developed; adpressed hind leg reaches beyond wrist of adpressed foreleg; length of hind leg about equal to distance from snout to foreleg; fourteen or fifteen smooth lamellæ below fourth toe, slightly compressed but not distinctly keeled; tail tapering distinctly, compressed laterally.

Color in life.—Above, body variegated yellowish brown with a median row of quadrangular chocolate spots separated by equal areas of light yellow-brown; two or three very narrow, dim, brownish lines on either side of the median spots; laterally a broad band of chocolate brown from snout to hind limb, wider on neck and sides, more or less dovetailed with the lighter spots above; tail rather lighter in color, mottled with darker brown; legs slightly lighter above with brown stripes on their outer aspect; toes and fingers barred with brown; below yellowish white, with small brownish spots on throat; very numerous spots on undersurface of tail.

Measurements of Sphenomorphus curtirostris Taylor.

| | mm. |
|------------------|------|
| Total length | 98 |
| Snout to foreleg | 16 |
| Snout to vent | 44 |
| Tail | 54 |
| Axilla to groin | 21 |
| Foreleg | 10.5 |
| Hind leg | 15 |
| Width of head | 7 |

Variation.—The type of this species was collected by myself in Agusan Province between Simulao and Gibong Rivers. Two other specimens were taken in the same locality, and several from about Lake Mainit in the northeastern peninsula of Mindanao; seven were collected about Mount Maquiling, Luzon.

These specimens vary considerably in the relation of the prefrontals,* the frontal to the first superciliary, and in the arrangement of the frenals.

Out of fifteen specimens examined, three have the frenals normal, that is, one behind the other, both touching the labials; two have the posterior frenal fused with the lower anterior, thus leaving a single frenal in contact with the labial; and ten specimens have the anterior frenal divided into two superimposed scales and the posterior separated from the labials by the inferior preocular.† Nine specimens have the prefrontals in contact broadly, while six have them narrowly separated; in about the same proportion of specimens the frontal touches the first superciliary. The scale rows vary between thirty-eight and forty; the lamellæ under fourth toe, between fifteen and eighteen; and two specimens have the first supraocular broken into two scales. One specimen from Mount Maquiling has a black throat.

Remarks.—It appears that this species is closely related to *S. moellendorffi* (Boettger), from Tablas. It is differentiated, however, by an average of six to eight more scale rows around the body. The character of the frenal scales is not constant, and the condition which obtains in the type does not hold throughout the series.

The species is known only from the localities mentioned.

*The original description (Taylor op. cit.) states that "the nasals are separated in one half of the specimens, and form a suture in the others." For nasals read prefrontals.

† Very similar variations occur in *Sphenomorphus steerei* Stejneger.

SPHENOMORPHUS COXI Taylor

Sphenomorphus coxi TAYLOR, Philip. Journ. Sci. § D 10 (1915) 100.

Description of species.—(From No. 70, E. H. Taylor collection; collected at Bunawan, Agusan, September, 1912, by E. H. Taylor.) Rostral forms a slightly curved suture with frontonasal; latter very much broader than long, laterally in contact with anterior frenal; behind, it forms a suture with frontal less than one-half as wide as rostral suture; no supranasals; prefrontals about half as large as frontonasal, not widely separated, in contact with two frenals, first superciliary, and narrowly with first supraocular; frontal moderate, kite-shaped, in contact with two supraoculars, as wide as, or slightly narrower than, supraocular region; frontoparietal a single

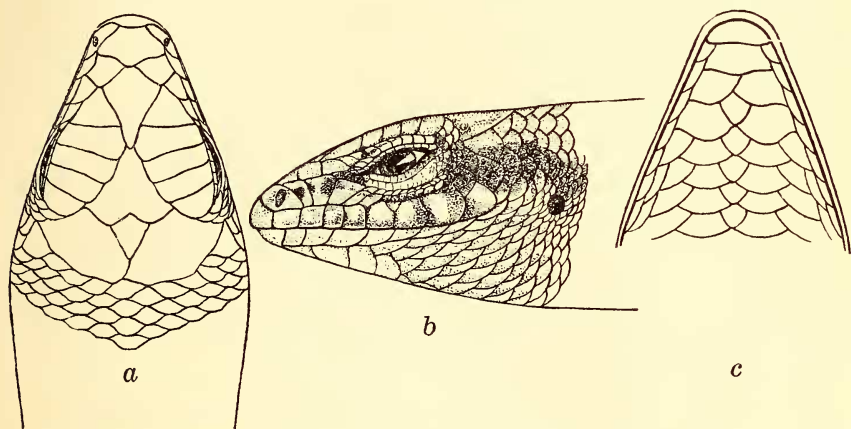


FIG. 19. *Sphenomorphus coxi* Taylor; a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

scale, wider than frontal but slightly shorter; interparietal very small; parietals large, forming a moderate suture behind interparietal; nasal single, set diagonally, with nostril pierced near middle, touching two labials, followed by a single, narrow, anterior frenal and a second frenal lower and broader; two preoculars superimposed, upper smallest, lower followed by two narrow scales placed diagonally above fourth and fifth labials; five supraoculars, first twice as long as second, second broadest, last followed by four scales arranged in pairs, two of which border parietal but do not separate it from fifth supraocular; eleven superciliaries, first largest; two or three small scales above upper preocular, and a number of small scales below eye, bordering sixth and seventh labials; a much-enlarged temporal

borders parietal and is surrounded by three large and two smaller temporals; seven upper labials, sixth and seventh largest, below eye; mental large, followed by a single azygos postmental; this followed by two pairs of chin shields bordering the labials, first in contact, second pair separated by a single scale; thirty-six scale rows around body, laterals somewhat smaller than dorsals or ventrals; two enlarged preanals; the median row of scales under tail slightly widened; ear opening very much smaller than eye; tympanum rather deeply sunk; eye nearly equal to its distance from nostril; distance of eye to ear greater than distance of eye to nostril; lower eyelid scaly; adpressed hind leg just fails to reach elbow of adpressed foreleg; twenty-two lamellæ under fourth toe.

Color in life.—Above rather reddish brown with a series of dim, irregular, slightly darker bands separated by very narrow, irregular, broken, lighter lines across back but darker on sides, where they appear as large blackish spots (especially on neck and shoulder), more indistinct along sides; many small black spots scattered along back and on tail; head lighter brown with yellow spots on labials; a distinct dark spot between eye and ear; tail with narrow, broken, lighter, transverse bands, rather indistinct, about thirty-seven in number; throat and chin with a few darker markings; belly immaculate dull white; arms and legs above mottled and finely streaked with darker; tail below dull purplish pink.

Measurements of Sphenomorphus coxi Taylor.

| | mm. |
|---------------|-----|
| Total length | 166 |
| Snout to vent | 66 |
| Tail | 100 |
| Width of head | 11 |
| Width of body | 14 |
| Foreleg | 18 |
| Hind leg | 25 |

Variation.—Specimens from Mindanao vary but little among themselves. All have thirty-six scale rows, a single specimen excepted, which has thirty-four. The lamellæ under fourth toe are either twenty-two or twenty-three. The frontoparietal is constantly single. By this character the species is readily distinguished from *S. jagorii* that occurs in the same locality. However, in the Mindoro specimens of *S. jagorii* the frontoparietal is normally single. This form has been given subspecific rank. The differences in size and markings, however, distinguish *S. coxi* from the various subspecies of *S. jagorii*.

Remarks.—The species is known only from eastern central Mindanao and is very probably confined to this island, and perhaps the islands to the northeast. In habit it is terrestrial, and it is usually found under logs and leaves or running about on the ground.

SPHENOMORPHUS LUZONENSIS (Boulenger)

PLATE 15, FIG. 1

Lygosoma luzonense (sec. *Hinulia*) BOULENGER, Proc. Zool. Soc. London (1894) 733, pl. 49, fig. 2.

Description of species.—(From No. 1625, Bureau of Science collection; collected at Banaue, Ifugao, northern Luzon, May, 1918, by H. Otley Beyer.) Body slender, elongate, the scales extremely smooth and shiny; snout moderately short; rostral moderate; frontonasal broader than long, forming a broad, straight suture with rostral; prefrontals much broader than wide, completely fused (probably abnormal); frontal rather narrow and elongate, longer than its distance to end of snout, and longer than frontoparietal; four supraoculars, anterior largest, triangular, not or but slightly in contact with prefrontals; frontoparietal a single scale; parietals elongate, forming a suture behind the small interparietal; no nuchals; nostril pierced in a single nasal; two normal frenals, first higher and narrower than second; two preoculars between first superciliary and third labial; length of orbit equal to distance of eye from nostril; six or seven superciliaries; temporals enlarged, that touching parietal very large; seven upper labials, fourth, fifth, and sixth below eye; mental small, followed by a very large postmental, longer than wide; first pair of chin shields in contact; ear opening large, rounding, nearer foreleg than end of snout; scales smooth, in twenty-eight rows about body, the four median dorsal rows enlarged, of nearly equal size; preanal scales distinctly enlarged; legs weak, barely meeting when adpressed; thirteen lamellæ under fourth toe.

Color in alcohol.—Above yellowish brown, somewhat lighter on tail, with a median dark stripe broken by groups of very small whitish dots; head darker with an indefinite dark inter-orbital area, and a few minute scattered whitish dots; a broad, slightly undulous, dark line begins behind ear opening and continues on tail, the upper edge bordered by a row of small grouped whitish dots; sides, below dark stripe, grayish brown with numerous whitish dots which are also on sides of tail; temporal

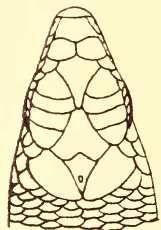


FIG. 20. *Sphenomorphus luzonensis* (Boulenger); after Boulenger; head-dorsal view; enlarged.

region with a blackish spot; upper and lower labials grayish with white spots; neck and chin whitish, marbled and spotted with darker; belly pinkish white; base of tail pinkish. Tail broken and regeneration merely begun.

Measurements of Sphenomorphus luzonensis (Boulenger).

| | mm. |
|--------------------|-----|
| Total length | 65 |
| Snout to vent | 41 |
| Tail, part missing | 24 |
| Snout to foreleg | 15 |
| Axilla to groin | 22 |
| Length of head | 9.2 |
| Width of head | 5.2 |
| Foreleg | 10 |
| Hind leg | 15 |

Remarks.—This specimen agrees with the type in scalation of head and body, but there are certain differences in the proportions of the various measurements. The specimen at hand is larger than the type; the hind leg is longer than in the type and equals the distance from snout to foreleg instead of from posterior part of eye to foreleg; the coloration and markings, however, are rather similar; the union of the prefrontals in the described specimen is probably abnormal.

This rare species is known only from the high mountains in northern Luzon. The type is from "Mt. Benguet," where the collector, Whitehead, made a considerable collection of mammals. The specimen described is from near Banaue, Ifugao,* at an elevation of about 2,000 meters.

SPHENOMORPHUS DECIPIENS (Boulenger)

PLATE 15, FIG. 2

Lygosoma decipiens BOULENGER, Proc. Zool. Soc. London (1894) 734, pl. 49, fig. 3.

Description of species.—(From Boulenger.) "This small Scink so much resembles the preceding [*Lygosoma luzonense*] in coloration and in the scaling of the head that one would

* Mr. Beyer made a considerable herpetological collection about Banaue in May, 1918. Among the specimens collected at this high elevation were the following snakes, lizards, and frogs:

Elaphe erythrurus (Duméril and Bibron), *Cyclocorus lineatus* (Reinhardt), *Natrix spilogaster* (Boie), *Mabuya multicarinata* (Gray), *Calotes marmoratus* (Gray), *Oxyglossis lævis* Günther, *Rana magna* Stejneger, and *Polypedates leucomystax* (Gravenhorst) (both the spotted and the lined forms).

at first be inclined to refer it to the same species. It differs, however, in several important characters. The ear-opening is much larger and oval, nearly two-thirds the size of the eye-opening. The rostral forms a much broader suture with the fronto-nasal; the frontal is slightly longer than the fronto-parietal. The body is shorter, the distance between the end of the snout and the fore limb once and one-fourth to once and one-third in the distance between axilla and groin. The length of the hind limb equals the distance between the nostril and the fore limb. There are 36 scales round the middle of the body. The tail tapers gradually from the base. As stated above, the coloration is much the same as in *L. luzonense*; there are, however, no other dark spots on the back but those forming the interrupted vertebral line; a well-defined dark brown streak, continued as a dorso-lateral line, extends along each side of the head and neck, passing through the eye, and the temple and neck below it are white."

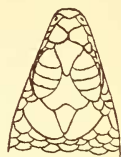


FIG. 21. *Sphenomorphus decipiens* (Boulenger); after Boulenger; head, dorsal view; enlarged.

Measurements of Sphenomorphus decipiens (Boulenger).

| | mm. |
|--------------|-----|
| Total length | 80 |
| Head length | 9 |
| Head width | 5 |
| Body | 26 |
| Foreleg | 10 |
| Hind leg | 12 |
| Tail | 45 |

"Both this species and the preceding [*L. luzonense*] connect the sections *Hinulia* and *Homolepida*, but should be referred to the former, as defined by me.¹"

"Two specimens were obtained by Mr. Whitehead on Isabella [sic], N. E. Luzon."

This species is one of the group of closely related small Philippine skinks. I have been unable to obtain any specimens which are referable to this form. Only the two type specimens are known.

SPHENOMORPHUS BIPARIETALIS Taylor

Sphenomorphus biparietalis TAYLOR, Philip. Journ. Sci. § D 13 (1918) 249.

¹ Through an oversight, the section *Hinulia* is stated in my Catalogue to be characterized by distinct frontoparietals; *L. acutum* forms an exception in having these shields fused. [Boulenger's footnote 1.]

Description of species.—(From the type, No. 1991, Bureau of Science collection; collected at Lapac, Sulu Archipelago, September 28, 1917, by E. H. Taylor.) Head short; snout truncate, rostral rather small, forming a board straight suture with frontonasal; latter wider than deep, minutely in contact with frontal; prefrontals large, barely separated, touching minutely first supraocular; frontal much longer than broad, scarcely as wide as supraocular region, in contact with two supraoculars; frontoparietals large, distinct, touching three supraoculars; interparietal small, longer than wide; parietals nearly rectangular, broadly in contact with each other behind interparietal; a second pair of parietals between first pair and last supraocular; this pair much smaller, in contact with frontoparietals,

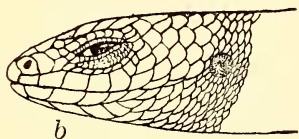
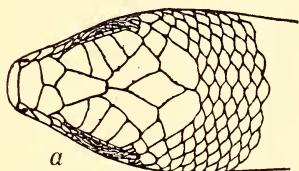


FIG. 22. *Sphenomorphus biparietalis* Taylor, from Sulu; a, head, dorsal view; b, head, lateral view; $\times 4$.

the last supraocular, and one or two small temporals; no nuchals; nostril pierced in a single nasal, which is followed by one frenal; latter followed by two preoculars, between first superciliary and second labial, the lower largest; behind this a row of seven subequal scales, separating labials from orbit; six upper labials, third, fourth, and fifth below eye; six lower labials; temporals slightly enlarged; mental small, followed by a broad postmental; two pairs of chin shields, both broad, first pair in contact broadly; ear opening large, round; tympanum

not deeply sunk; limbs weak, failing to meet when adpressed by considerable distance; thirty-two scale rows around body, those on belly largest; lateral rows in straight longitudinal lines; preanal scales not enlarged; third and fourth toes of almost equal length, ten smooth lamellæ under each; scales on underside of tail not enlarged; ear much nearer foreleg than end of snout.

Color in life.—Above brownish, many of the scales flecked with whitish; a more or less distinct, light, dotted line from behind eye along side; below this a stripe of slightly darker brown flecked with white; below cream; underside of tail flecked with brown; upper and lower labials with light spots;

Measurements of Sphenomorphus biparietalis Taylor.

| | mm. |
|------------------|------|
| Total length | 70 |
| Snout to vent | 35 |
| Snout to foreleg | 11.5 |
| Tail | 35 |
| Axilla to groin | 21 |
| Width of head | 5 |
| Foreleg | 8 |
| Hind leg | 11 |

Variation.—Eleven other specimens are from various localities in the Archipelago, as follows: Basilan, 1; Jolo, 4; Lapac, 1; Tawitawi, 1; Sangasanga, 1; Papahag, 2; Bongao, 1.

The Basilan specimen is darker, and more heavily built; the head is slightly broader; the scales are in thirty-six rows about body; the prefrontals are broadly in contact; the throat has black spots; and two frenals are present on the right side.

The specimens from Jolo are lighter, and the two lateral light lines more or less distinct. The type is from Lapac. Specimens from the more southern part of the Archipelago have from thirty to thirty-four scale rows about the body, and the number of labials varies, being either five or six.

Remarks.—This species seems to be very clearly differentiated by the arrangement of the parietals which is different from that in any other form in the Islands. The only Philippine lizard in which the parietals approach this condition is the variation of *Brachymeles vermis* Taylor, found on Papahag near Tawitawi.

SPHENOMORPHUS MOELLENDORFFI (Boettger)

Lygosoma (Homolepida) moellendorffi BOETTGER, Zool. Anz. 20 (1897) 162.

Description of species.—(After Boettger.) Habitus slender, somewhat short-legged; distance between end of snout and fore limb contained one and one-half times in distance from axilla to groin; snout short, truncate; under eyelid scaled; nostril in the middle of a large nasal; no supranasals; two simple frenals standing behind each other; frontonasal much broader than long, forming a broad suture with rostral; prefrontals in contact in the middle; frontal much shorter than frontoparietals and interparietals together; in contact with first two supraoculars; four supraoculars, first longest, second broadest; nine

superciliaries; frontoparietals united in a single large shield; interparietals large, similar in form to frontal but smaller; parietals in contact behind interparietals; nuchals wanting; seven supralabials, fifth below eye but separated from it by a row of small scales; auricular opening vertically oval, large, two-thirds of eye opening; no projecting lobules on anterior border; thirty-two scales about middle of body, smooth; lateral scales somewhat smaller than dorsals and ventrals; two enlarged preanals, which are longer than broad; hind leg stretched forward reaches a little more than half the distance from axilla to groin; fingers and toes cylindrical, fourth toe with sixteen smooth subdigital lamellæ.

Color.—Above dark reddish brown with a median line of dark spots; a dark dorsolateral stripe runs from eye. The dark dorsolateral stripe has a small, three-cornered spur in the region of the foreleg, bordered above with a bright line and below with lighter spots. Below bright reddish brown, lips and sides of head flecked and marbled with brown; throat with brown longitudinal stripes.

Measurements of Sphenomorphus moellendorffi (Boettger).

| | mm. |
|----------------|------|
| Total length | 90 |
| Length of head | 8 |
| Width of head | 6.25 |
| Head to anus | 44 |
| Foreleg | 10 |
| Hind leg | 14 |
| Tail | 46 |

Remarks.—No specimen of this species has been examined. It appears that the type specimen (No. 6318a Senckenberg Museum from Tablas, Philippine Islands) is unique. This description is taken from the original type description by Boettger.

SPHENOMORPHUS STEEREI Stejneger *

Sphenomorphus steerei STEJNEGER, Proc. U. S. Nat. Mus. 34 (1908) 202; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 372.

* The small lizards in this group, which includes *S. steerei* Stejneger and *S. luzonensis* (Boulenger), are quite closely related, are about the same size, and have much the same color pattern. Apparently both of these forms were described from single specimens and, in the case of the former, presumably from an immature specimen. Fortunately, I have been able to obtain specimens of *S. steerei* from the type locality, Guimaras Island. These agree very well in scalation but vary in the proportions of legs and body; thus the legs are rather longer in proportion in young specimens than in adults. One specimen has the ear slightly nearer the snout than the foreleg.

Description of species.—(From No. 968, E. H. Taylor collection; collected on Guimaras Island, December 28, 1914, by E. H. Taylor.) Snout pointed, the supraocular region but slightly raised; rostral large, broadly in contact with frontonasal; latter much broader than deep; prefrontals broadly in contact; frontal shorter than frontoparietal, touching two supraoculars and first superciliary; frontoparietals single; interparietal shorter than frontal; parietals form a suture behind interparietal; four supraoculars; eight superciliaries; nostril pierced in the middle of a diagonally elongate nasal; two vertical frenals, both touching labials; lower eyelid scaly; seven upper labials separated from orbit anteriorly by one row, posteriorly by two rows, of small scales; temporals distinctly enlarged, two anteriorly; no nuchals; ear opening large, about two-thirds eye opening, distinctly nearer foreleg than end of snout; thirty smooth scale rows about body; preanals enlarged; adpressed limbs meet; fourth toe with twelve lamellæ below; scales below tail not enlarged.

Color in life.—Above light brown with a broken line of dark brown medially; two short brownish lines evident on either side beginning on occipital region; dorsolaterally a dark line beginning on neck above ear continues to tail, where it is broken up into a series of dark, almost black spots; limbs brown, with roundish light spots; head mottled with brown; labials brown, each with a yellowish spot; below pinkish white, undersides of tail specked with brown.

Measurements of Sphenomorphus steerei Stejneger.

| | mm. |
|---------------------------------|------|
| Length, tip of tail regenerated | 66 |
| Snout to vent | 27 |
| Width of head | 4.5 |
| Axilla to groin | 15.2 |
| Snout to foreleg | 11 |
| Foreleg | 6.4 |
| Hind leg | 10 |

Variation.—I have also referred to this species specimens from Canlaon Volcano, Negros; from Butuan, Mindanao; from

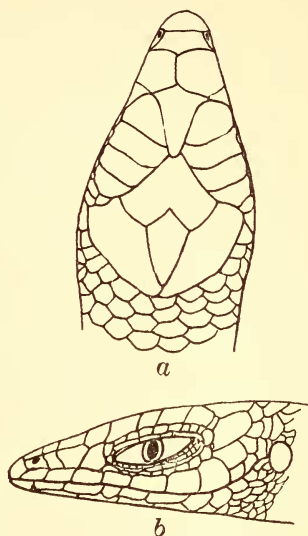


FIG. 23. *Sphenomorphus steerei* Stejneger; after Stejneger; a, head, dorsal view; b, head, lateral view; enlarged.

Mount Maquiling, Luzon; and from Mindoro. They vary as follows:

Canlaon specimens.—The anterior frenal consists of either a single vertical scale or two superimposed scales (44 per cent show the latter condition); the second loreal is small and is never in contact with the labial. The specimens reach a larger size, and are darker in color. The median dark line has the appearance of being continuous with a chain of lighter spots on it; the limbs are shorter in proportion to the size of the body; the adpressed limbs do not meet; the male has a brilliant rose red spot below the neck, and the belly is canary yellow; usually black spots are present on the preanal scales; the prefrontals occasionally are separated. Fifty-five specimens were examined.

Mindoro specimens.—The specimens here agree well with those from Negros. In the four specimens examined from this island the frontal is broken and forms a small, regular scale between frontal and prefrontal.* The markings are very similar.

Butuan specimens.—Ten specimens of this form were collected in the swamps near the town of Butuan, Mindanao. The frenals are normal; that is, both are vertical and both in contact with the labials; the color is chestnut brown; the body is slenderer, and the tail elongate. The snout and body appear slenderer and more elongate than in the typical form.

Mount Maquiling specimens.—Eight specimens were collected on Mount Maquiling. These on the whole are smaller than other specimens; the markings are very similar to those of the type form. The frenals are vertical, both touching the labials.

Remarks.—It is possible that some of these forms might profitably be separated into species or subspecies, since to the eye they appear distinctly different. However, the absence of stable characters to define these differences causes me to wait until specimens from more localities are available.

SPHENOMORPHUS LLANOSI Taylor

PLATE 16

Sphenomorphus llanosi TAYLOR, Philip. Journ. Sci. 14 (1919) 121, pl. 2.

Description of species.—(From the type, an unnumbered specimen in Santo Tomás Museum, Manila; collector unknown; probably from Luzon.) Habit lacertiform; snout narrower and longer than in *Sphenomorphus jagorii*; rostral much wider

* This same curious anomaly occurs in specimens of *S. jagorii divergens*, found in the same locality.

than high, much narrowed laterally in front of first labial below nasal; frontonasal a little broader than deep, forming a straight suture with rostral, laterally in contact with upper anterior frenal, posteriorly in contact with frontal; prefrontals rectangular, separated in the middle, in contact laterally with upper anterior frenal, the posterior, and a single superciliary; frontal much elongate, narrowed behind and in front; distance between supraocular regions about one-third the width of region above one eye; frontal little shorter than frontoparietal and interparietal length, in contact with two supraoculars; frontoparietals slender, pointed in front, forming a common suture much more than half their length; interparietal nearly as broad as frontal, but not nearly as long; as large as a single frontoparietal scale; parietals large, in contact behind interparietals, touching last supraocular and two small postoculars; no nuchals; nasal quite large, the scale placed diagonally, touching only one labial; two anterior frenals superimposed, the two not as high as nasal, but higher than the very large frenal following, which is much wider at top than at bottom, touching two labials; two preoculars, lower largest, followed by two moderately large scales below eye, second partly wedged in between fifth and sixth labials; ten superciliaries; five large supraoculars followed by two paired scales, first supraocular more than a third of the length of the supraocular region, second widest; nine upper labials, sixth below orbit, sixth and seventh largest; five distinctly enlarged temporals, the largest bordering parietal; eight or nine lower labials; one unpaired postmental; two paired chin shields, first pair in contact, second separated by one scale; anals enlarged; twenty-three lamellæ under longest toe; ear opening moderate, vertically oval; forty-two scale rows around middle of body; adpressed hind leg reaches beyond elbow of adpressed foreleg; adpressed foreleg reaches anterior corner of eye.

Color in alcohol.—Above rich reddish brown traversed by about thirteen indistinct bands of light, black-edged dots on back, and continuing on tail; behind eye to above foreleg is a large, broad, dark brown stripe, bordered below by a white stripe which begins on second labial and continues back to ear, then widens and takes a backward and downward course to front limb; below this there is a rather irregular mottled area of brown; lower labial flecked with brown; limbs above mottled with elongate light spots; sides somewhat lighter, flecked with brown; a brown area above hind limb; below yellowish. There is a very dim row of brown spots along upper lateral region.

Measurements of Sphenomorphus llanosi Taylor.

| | mm. |
|-----------------------|------|
| Total length | 148 |
| Tail, end regenerated | 60 |
| Foreleg | 16 |
| Hind leg | 26 |
| Axilla to groin | 27.5 |
| Snout to foreleg | 21.5 |
| Snout to eye | 5 |
| Eye to ear | 5.2 |
| Ear to foreleg | 8.5 |
| Width of head | 9 |

Remarks.—This species is closely related to *Sphenomorphus jagorii*, but differs in the following points: The first frenal is divided and the scales are superimposed; the second frenal is proportionately much larger; there are five instead of four large supraoculars; the frontoparietals are slenderer and extend farther forward; the coloration is also distinctive; there are more rows of scales about the body.

Unfortunately the collections in the Santo Tomás Museum are unnumbered, and for the most part are without authentic localities. It is highly probable that this species is from Luzon, and perhaps the northern part of the island. Only a single specimen, the type, is present in the collection.

It has been named for the Manila scientist Rev. Florencio Llanos, rector of San Juan de Letrán College, professor in the University of Santo Tomás, and director of Santo Tomás Museum, who has been untiring in his courtesy and has rendered much assistance in my study of the Santo Tomás collections.

SPHENOMORPHUS VARIEGATUS (Peters)

PLATE 14, FIG. 1

Lygosoma melanopogon, part., DUMÉRIL and BIBRON *Erp. Gén.* 5 (1839) 723.

Lygosoma (Hinulia) variegatum PETERS, *Mon. Berl. Ak.* (1867) 20.

Lygosoma (Hinulia) nævium PETERS and DORIA, *Ann. Mus. Genova* 13 (1878) 340.

Lygosoma variegatum BOULENGER, *Cat. Liz. Brit. Mus.* 3 (1887) 246; DE ROOIJ, *Rept. Indo-Aust. Arch.* 1 (1915) 196.

Sphenomorphus variegatus BARBOUR, *Mem. Mus. Comp. Zool. Harvard Coll.* 44 (1912) 90.

Description of species.—(From No. 535, E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, 1912, by E. H. Taylor.) Snout short, obtuse, the supraocular region raised and the intersupraocular region very narrow; rostral broad and low; frontonasal very much broader than long, broadly in con-

tact with rostral; prefrontals large, broadly in contact medially; frontal elongate, drawn to a slender point behind, narrower than supraocular region; seven supraoculars, last very small, second and third widest; three supraoculars in contact with frontal; frontoparietals distinct; interparietal small; parietals forming a suture behind it; no nuchals; nostril pierced in a single nasal; latter followed by two superimposed frenals, the lower largest; these followed by a large frenal separated from orbit by three superimposed preoculars; eleven superciliaries, first very large; several enlarged temporals and several smaller ones; seven upper labials, fifth and sixth below eye; six lower labials; mental narrow, followed by an azygos postmental; this followed by four paired chin shields, only one pair of which is in contact; forty

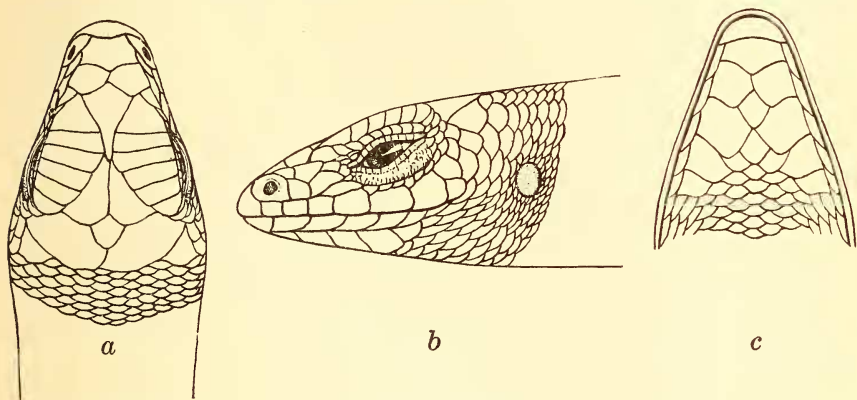


FIG. 24. *Sphenomorphus variegatus* (Peters); a, head, dorsal view; b, head, lateral view; c, chin; $\times 2$.

rows of smooth scales about body, dorsals only slightly smaller than ventrals; scales under tail not enlarged; eye equidistant from tip of snout and ear opening; latter vertically elongate, much smaller than eye, nearer foreleg than end of snout; legs strong, adpressed hind leg reaches shoulder; digits slender, compressed, with twenty-three uncarinate lamellæ below fourth toe; preanals somewhat enlarged; tail much broadened at base, but tapering quickly to one-half its basal width, then gradually to a fine point.

Color in life.—Above yellowish brown with two more or less distinct rows of irregular, dark brown spots medially; laterally with a distinct dark spot on neck, and a broken, irregular, dark stripe along side of body and neck (sometimes dim or wanting); below yellowish to pinkish white; labials with dark and light

spots; frequently a dark line from eye to ear; dim yellowish spots scattered on back and sides, and above limbs.

Measurements of Sphenomorphus variegatus (Peters).

| | mm. |
|------------------|-----|
| Total length | 155 |
| Snout to vent | 57 |
| Snout to foreleg | 23 |
| Tail | 98 |
| Width of head | 9 |
| Axilla to groin | 26 |
| Foreleg | 22 |
| Hind leg | 33 |

Variation.—Fourteen specimens are in the collection from the Agusan Valley, and they agree fairly well in scalation; the young are always more brilliantly marked, the tails being a rosy pink color, and the light spots on legs and along the lateral dark stripe are brilliant yellow; in each of two specimens (Nos. 542 and 536, E. H. Taylor collection) there is a small scale intercalated between the prefrontals, while in No. 548 (E. H. Taylor collection) the frontal is in contact with the frontonasal.

Remarks.—The species is largely terrestrial, and specimens are found running on the ground or feeding under logs, about stumps, and the bases of trees. When alarmed they most frequently take refuge in trees, running around the trunks and keeping out of sight of the pursuer. They rarely ascend any considerable distance in a tree.

In the Philippines the species appears to be confined to the southern part of the Archipelago; Dinagat Island is the most northern record. Found also in Borneo, Celebes, New Guinea, and the Bismarck Archipelago. The type locality is "Philippines," very probably from Mindanao, and very probably collected there by Dr. C. Semper, although Peters does not explicitly state that such is the case.

SPHENOMORPHUS ARBORENS Taylor

PLATE 17

Sphenomorphus arborens TAYLOR, Philip. Journ. Sci. § D 12 (1917) 373, pl. 1.

Description of species.—(From the type, No. 413, E. H. Taylor collection; collected on Mount Canlaon, Occidental Negros, December 20, 1915, by E. H. Taylor.) (Adult male.) Head short and blunt, rostral bent backward over snout, forming a curved suture with frontonasal; latter much wider than deep,

in contact with first frenal; no supranasals; prefrontals very large, broadly in contact; frontal triangular, its broadest part anterior to first supraocular, in contact with three supraoculars; frontoparietals distinct, broadly in contact, elongate, touching three supraoculars; parietals large, forming a suture behind interparietal, which is narrow and elongate; nasal large, pierced by a rather large nostril; two frenals, first higher and narrower than second, which is larger than first; two preocular scales superimposed, the lower much the larger; two or three rows of scales between labials and orbit; ten superciliaries, first especially large, in contact with frontal; five supraoculars, last very small (can scarcely be considered a supraocular); lower eyelid covered by two rows of scales, the upper small, second row vertically elongate, enlarged, eleven or twelve in number; small postoculars; five temporals, that bordering parietal very large; ear large, about one-half diameter of eye; six upper labials, fourth and fifth below eye, fifth largest; lower labials four or five, very narrow and elongate; mental moderate, first postmental more than twice as deep; four pairs of chin shields, first pair in contact, second pair separated by one scale, third pair by three scales, fourth pair broken in two; forty to forty-two scale rows about body, laterally arranged in vertical rows; two enlarged preanals, with enlarged scales in front of them; twenty-one rounding lamellæ under fourth toe; adpressed hind leg fails to reach axilla, but reaches to near elbow of adpressed foreleg; ear slightly nearer foreleg than end of snout.

Color in life.—Above brown, variegated with lighter and darker scales, and a median row of irregular dim, dark spots; a lateral stripe, beginning on point of nose, widening behind ear, continues as a broken line of dark, irregular spots to some distance on tail; labials and chin muddy white with bluish tinge; belly with a wash of canary yellow; tail spotted below; spots present on preanal scales.

Measurements of type of Sphenomorphus arborens Taylor.

| | mm. |
|---------------------|-----|
| Total length | 168 |
| Snout to vent | 65 |
| Vent to end of tail | 103 |
| Snout to foreleg | 25 |
| Axilla to groin | 32 |
| Width of head | 9 |
| Width of body | 10 |
| Foreleg | 20 |
| Hind leg | 28 |

Variation.—The collection contains six adult specimens and seven young, all taken on Mount Canlaon. There is a slight amount of variation in the width of the frontal and in its relation with the first superciliary. Several of the specimens have neck and throat a dark muddy color, with a bluish tinge; the young are colored like the adults.

Remarks.—This species superficially resembles *Sphenomorphus variegatus* (Peters), but differs in a number of essential points. There are fewer supraoculars, the scales on the foot, and especially the heel, are larger; the first frenal is high and not superimposed above another; the hind leg is much shorter and does not reach the axilla. In *S. variegatus* the hind leg reaches halfway between the foreleg and ear.

It is common on Mount Canlaon at an elevation of 800 to 1,200 meters; it is strictly arboreal, and is seldom seen on the ground.

• SPHENOMORPHUS FASCIATUS (Gray)

PLATE 12, FIG. 3

Hinulia fasciata GRAY, Cat. Liz. (1845) 75; F. MÜLLER, III. Nacht. Cat. Herp. Samml. Basel. Mus. (1883) 21; FISCHER, Jahrb. wiss. Anst. Hamburg 2 (1885) 80.

Lygosoma (Hinulia) fasciatum PETERS, Mon. Berl. Ak. (1872) 583.

Lygosoma fasciatum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 237, pl. 15, fig. 2.

Sphenomorphus fasciatus TAYLOR, Philip. Journ. Sci. § D 12 (1917) 372.

Description of species.—(No. 534, E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, 1912, by E. H. Taylor.) Body elongate, limbs short; snout short, obtuse; frontonasal broader than deep, forming a narrow, curved suture with rostral, in contact with nasal and anterior frenal laterally; no supranasals; prefrontals large, not touching supraocular, barely in contact medially; frontal nearly as long as frontoparietals and interparietal together, as wide as supraocular region; five supraoculars, second widest, first two in contact with frontal; frontoparietals distinct, longer than wide; interparietal small, the parietals forming a broad suture behind it; five pairs of nuchals; nostril pierced in a single nasal; two frenals, second lower and wider than first; two preoculars, lower largest; nine superciliaries, first touching frontal; lower eyelid scaly; several enlarged temporals, those in front of ear opening vertically elongated, largest in contact with parietal; eight upper labials, sixth below eye but separated from orbit by a row of scales; six lower labials not much longer than wide; mental moderate, followed by one postmental, touching two labials and four paired chin

shields, first two in contact; twenty-eight rows of smooth scales around body, the two dorsal median rows transversely dilated; scales under tail small; preanals enlarged; legs weak, not meeting when adpressed; digits compressed; fourth toe longest with twenty-two keeled, divided lamellæ below; tail thick, nearly one and one-third times as long as head and body, cylindrical, tapering gradually; ear opening oval, not as large as eye; latter slightly nearer tip of snout than ear; latter nearer foreleg than tip of snout; no auricular lobules present.

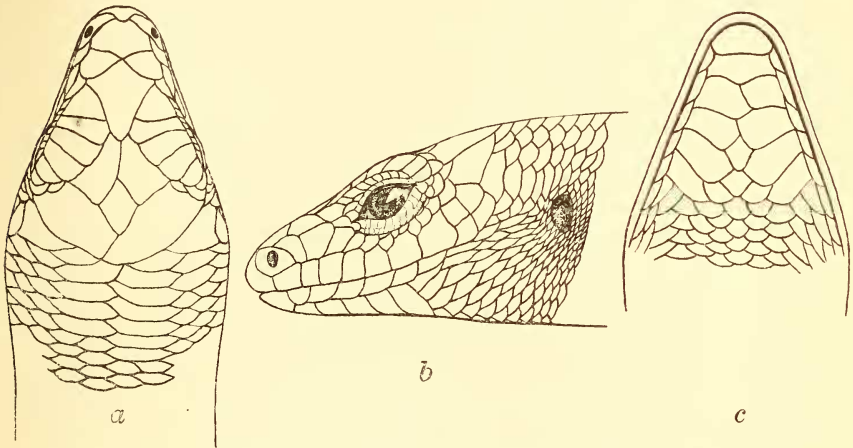


FIG. 25. *Sphenomorphus fasciatus* (Gray); a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

Color in life.—Above brownish black, head spotted and barred with white, body traversed by twelve narrow, milky white bars not more than one scale wide and frequently broken; about thirty rings of light dots around tail; belly pinkish, with much brown on chin and throat, and scattered spots on abdomen; tail dark below.

Measurements of Sphenomorphus fasciatus (Gray).

| | mm. |
|-----------------------|------|
| Total length | 183 |
| Snout to vent | 73 |
| Tail, tip regenerated | 110 |
| Snout to foreleg | 25 |
| Axilla to groin | 41 |
| Width of head | 9 |
| Foreleg | 17.5 |
| Hind leg | 23.5 |

Variation.—Fourteen specimens in my collection show but little variation in scalation. In one or two the prefrontals barely touch, but in normal specimens they form a distinct suture.

The regenerated tail is reddish brown; the ground color varies from light brown to almost black.

Remarks.—This is a burrowing species and is usually found under logs or in burrows in the earth about rotting stumps. I have never seen it in the open, unless first disturbed. It is fairly common at Bunawan, Agusan. Two eggs are laid; these are placed under the earth, usually in or about rotting stumps or logs.

Three specimens in the Bureau of Science collection were obtained by me at Zamboanga, and on Teipono Island off the coast of Basilan. The island is an extremely low, very small, coral island; the highest elevation is probably not more than one meter above high-tide mark.

The Zamboanga specimens were obtained under partly submerged logs at the edge of a small mountain stream.

The type is in the British Museum, collected by H. Cuming, 1836–1840; the type locality is "Philippines." In the Philippines the species is known from several localities in Mindanao, and from Teipono Island, near Basilan. Peters records a specimen from Celebes. De Rooij makes no mention of its occurrence there. The specimen was collected by Dr. A. B. Meyer, who also collected in the Philippines. It is not at all improbable that Meyer's specimen was collected in Mindanao.

SPHENOMORPHUS LEDNICKYI Taylor

PLATE 18, FIG. 3

Sphenomorphus lednickyi TAYLOR, Philip. Journ. Sci. 14 (1919) 120.

Description of species.—(From the type, No. R1992, E. H. Taylor collection; collected on Masbate Island, June, 1916, by Victor E. Lednicky.) Rostral only slightly visible from above, forming a broad, rather curved suture with frontonasal; latter much broader than deep, broader behind than in front, in contact with anterior frenal; prefrontals large, broadly in contact, touching both frenals laterally, not in contact with first supraocular; frontal as wide as, or slightly less than, supraocular region, in contact with first superciliary and two supraoculars, narrowed behind; frontoparietals distinct, rather elongate, broadly in contact; interparietal much longer than wide, with a distinct "eye-spot;" parietals forming a suture behind interparietals; no nuchals present; five supraoculars, last very small, first deepest, second widest; nostril pierced in a single nasal; no

supranasals; anterior frenal not as high as nasal, much higher than wide; second frenal wider at top than bottom, lower than anterior; three preoculars superimposed, between first superciliary and third labial; six upper labials, fourth and fifth under eye, but separated from orbit by several scales; third labial smaller than second; five lower labials; mental small, followed by a very wide postmental; three pairs of chin shields, only first pair in contact; four enlarged temporals, that bordering parietal largest; auricular opening very large, tympanum very superficial; forty rows of scales around belly; scales on sides in longitudinal rows, all rows subequal in size; preanal scales distinctly enlarged; limbs well developed, adpressed hind leg reaching wrist of foreleg; latter brought forward reaches middle of eye; twenty-two lamellæ under longest toe; scales below tail scarcely broadened; eye a little nearer end of snout than ear; latter nearer foreleg than end of snout.

Color.—Head and body variegated brown above with dark areas over supraocular region and a median row of irregular black dots, extending somewhat on tail; a heavy black stripe begins behind eye and continues as a broken series of irregular spots along side of body and tail above legs; legs brown with black variegations and a light spot on knee; toes barred with black; throat and labials muddy white; belly light cream; tail below flecked with dark; a few cream yellow spots above and below the black stripe on neck.

Measurements of Sphenomorphus lednickyi Taylor.

| | Type. mm. | Cotype. mm. |
|------------------|--------------|----------------|
| Total length | 106 | 114 |
| Snout to vent | 46 | 50 |
| Snout to foreleg | 18 | 18.5 |
| Tail | 60 | 64 |
| Axilla to groin | 27 | 28 |
| Width of head | 7 | 8 |
| Length of head | 8.6 | 8.5 |
| Foreleg | 15 | 14 |
| Hind leg | 21 | 22.5 |

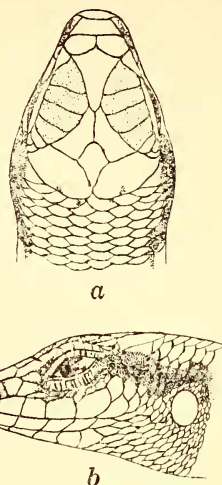


FIG. 26. *Sphenomorphus lednickyi* Taylor; a, head, dorsal view; b, head, lateral view; $\times 3$.

Variation.—The cotype from the same locality agrees in scalation, but the head is broader and the broad black stripe is almost wanting along the body. The regenerated tail has broad scales above and below.

Remarks.—The types were collected in Masbate near the Aroroy gold mines, by Mr. Victor E. Lednicky, formerly chief of the division of mines, Bureau of Science. He states that these lizards appear to be plentiful in that locality. Superficially this species resembles *Sphenomorphus curtirostris*, but the latter has the frontoparietal single, fourteen lamellæ under longest toe, more upper labials, and the nasal followed by superimposed frenals.

SPHENOMORPHUS JAGORII (Peters)

Lygosoma (Hinulia) jagorii PETERS, Mon. Berl. Ak. (1864) 54.

Hinulia variegata (non Peters) GÜNTHER, Proc. Zool. Soc. London (1873) 165, pl. 17, fig. B; (1879) 76.

Lygosoma jagorii BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 240.

Sphenomorphus jagori STEJNEGER, Proc. U. S. Nat. Mus. 33 (1908) 545; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 372.

This species is represented in the Philippines by several variant forms, worthy of subspecific distinction.

Key to the subspecies of Sphenomorphus jagorii (Peters).

- a^1 . Scales, 36 to 38 rows; frontoparietal divided; Luzon, Samar, Leyte, Mindanao, Negros..... S. j. *jagorii* (Peters) (p. 192).
- a^2 . Scales, 36 to 38 rows; frontoparietal single; southern Luzon, Mindoro. S. j. *divergens* subsp. nov. (p. 194).
- a^3 . Scales, 40 rows; frontoparietal divided; Mindanao, Sulu Archipelago. S. j. *palustris* Taylor (p. 194).
- a^4 . Scales, 44 rows; frontoparietal divided; Mount Canlaon, Occidental Negros..... S. j. *grandis* subsp. nov. (p. 195).

SPHENOMORPHUS JAGORII JAGORII (Peters)

Description of subspecies.—(From No. 814, E. H. Taylor collection; collected at Agusan, Mindanao, September 10, 1912, by E. H. Taylor.) Habit lacertiform; head rather pointed; supra-orbital region prominent; rostral very broad, visible above, moderately in contact with frontonasal which is broader than long; prefrontal quadrangular, laterally in contact with two frenals, separated from its fellow; frontal elongate, more than one and one-half times as long as wide, as long as the combined parietal length, as wide as or slightly less than the supra-ocular region; frontoparietals distinct, longer than wide, larger

than interparietal; parietals forming a suture behind interparietal; no nuchals; five supraoculars, anterior longest, second widest, last small, touching parietal, first two touching frontal; eleven superciliaries, first and tenth largest; nasal diagonally elongate, nostril pierced near center; two frenals, first narrowest; two large preoculars, upper small, lower somewhat smaller than second frenal; three narrow, elongate scales lying above fourth and fifth labials followed by two rows of small scales which separate labials from orbit; nine upper labials, sixth and seventh largest, last small; several enlarged temporals, that bordering parietal much the largest; ten lower labials, one touching postmental; mental twice as broad as deep followed by a single undivided postmental; two pairs of chin shields bordering labials, only first pair in contact; scales on body smooth, arranged in longitudinal rows on sides and forming almost perpendicular rows as well; scales in thirty-eight rows; two enlarged preanals; limbs well developed; twenty-three lamellæ under longest toe; hind leg reaches to near elbow of adpressed foreleg; length of eye equals distance from nostril; eye to end of snout equals distance from eye to ear; latter slightly nearer foreleg than end of snout.

Color in life.—Above brownish flecked with darker; a row of dark spots on side forming an elongate, rather broad stripe above hind leg, which continues a short distance on tail; scales on throat edged with darker; upper and lower labials with darker and lighter spots; below yellowish to dull white; legs above dark, spotted with lighter.

Measurements of Sphenomorphus jagorii jagorii (Peters).

| | mm. |
|------------------|------|
| Total length | 210 |
| Snout to vent | 83 |
| Tail | 127 |
| Snout to foreleg | 35 |
| Axilla to groin | 48 |
| Width of head | 14 |
| Length of head | 22 |
| Foreleg | 25.5 |
| Hind leg | 37 |

Variation.—The typical form of the species, represented by the specimen just described, is apparently quite constant in its essential characteristics. The divided frontoparietal, and thirty-six to thirty-eight scale rows mark this form. Specimens

which I have referred here are from the following localities: Baguio, four specimens; Mount Mariveles, Bataan, six specimens; eastern Mindanao, nineteen specimens. The type localities are Borongan, Samar, and Tacloban, Leyte. Specimens listed by Boulenger* will also be classed in this first group.

SPHENOMORPHUS JAGORII DIVERGENS subsp. nov.

Description of subspecies.—From the typical form this subspecies differs only in the presence of an unpaired frontoparietal scale; otherwise it appears to be identical with the typical form. The specimens in the collection referable to this form are: four from Mount Maquiling, Luzon; six from Lake Naujan, Mindoro; nine from Sumagui, Mindoro; and twelve from Calapan, Mindoro. It will be noted that the Luzon locality is on that part of the island lying nearest Mindoro.

Variation.—Out of the twenty-one specimens from Sumagui and Calapan, Mindoro, two have the frontoparietal divided normally. Each of the six specimens from Naujan, however, seems to be an individual freak. The first large supraocular is usually broken, the frontal entire or in two or even three apparently regular pieces; the frontoparietal is single, double, or, as in two cases, divided into three regular scales; the lamellæ under the fourth toe seem more numerous.

SPHENOMORPHUS JAGORII PALUSTRIS Taylor

Sphenomorphus palustris TAYLOR, Philip. Journ. Sci. § D 10 (1915) 102.

This form was first regarded as a separate species. A study of a large number of specimens from various parts of the southern islands causes me to regard it now as being of only subspecific value.

Differs from the typical form in having forty scale rows about the body; twenty to thirty lamellæ under the fourth toe; the body much darker with indistinct lighter brown stripes across the back, which are distinct laterally becoming bluish white in color; three light bars on the side of the head below the eye divided by a like number of black stripes; the eyelid is edged with golden yellow; and the limbs are black with fine longitudinal lighter lines running the length of the limbs. In size it agrees quite well with the typical form, save that the ear is nearer the end of the snout than the foreleg.

* Loc. cit.

Two specimens, the types of *Sphenomorphus jagorii palustris*, were collected at Bunawan, Agusan, where it is rare but where the other form, *S. jagorii jagorii*, is very common. One specimen was taken at Zamboanga, and several were taken on various islands in the Sulu Archipelago.

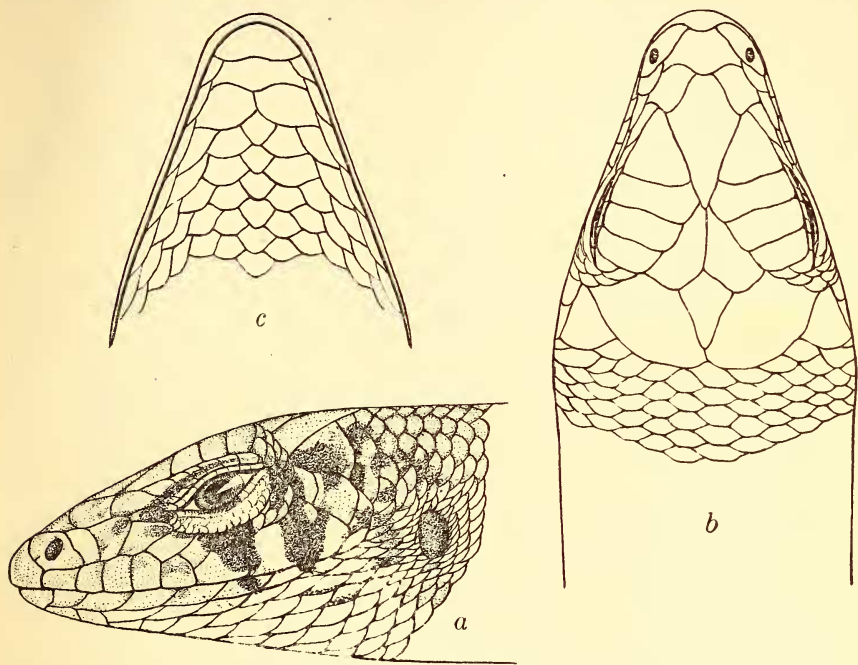


FIG. 27. *Sphenomorphus jagorii palustris* Taylor, from Sulu; a, head, lateral view; b, head, dorsal view; c, chin; $\times 3$.

SPHENOMORPHUS JAGORII GRANDIS subsp. nov.

Sphenomorphus jagori TAYLOR, Philip. Journ. Sci. § D 12 (1917) 372.

Type.—No. 1414, E. H. Taylor collection; collected on Canlaon Volcano, Negros, December 25, 1915, by E. H. Taylor.

Description of subspecies.—This form is apparently much larger than the other three forms, and in scalation it differs in having four more rows of scales around the body. The ear opening is nearer the snout than foreleg. The color pattern is rather different. There are twelve rather distinct black spots on side beginning behind ear; the large, elongated stripe is present above hind leg; above, the dark brown and the light brown color are about equally distributed in broad, irregular bands. the darker ones joining the black lateral spots; labials dark with a few lighter spots.

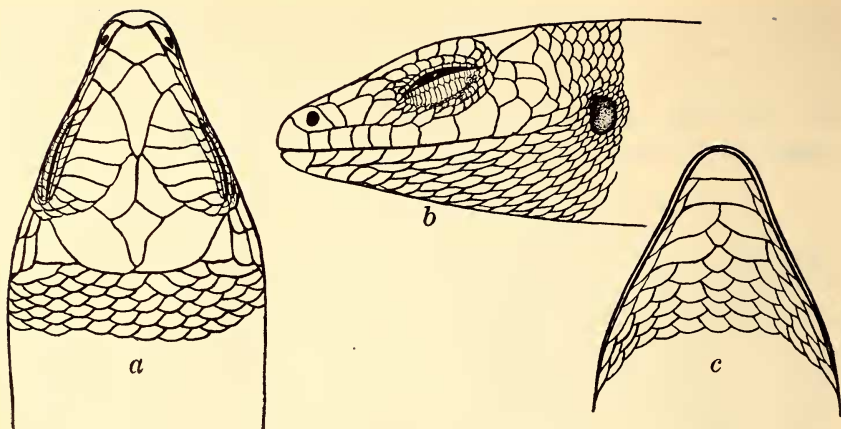


FIG. 28. *Sphenomorphus jagorii grandis* subsp. nov., from the type; a, head, dorsal view; b, head, lateral view; c, chin; $\times 2$.

Measurements of Sphenomorphus jagorii grandis subsp. nov.

| | mm. |
|------------------|-----|
| Total length | 270 |
| Snout to vent | 106 |
| Tail | 164 |
| Width of head | 18 |
| Length of head | 24 |
| Snout to foreleg | 42 |
| Axilla to groin | 55 |
| Foreleg | 31 |
| Hind leg | 44 |

A second specimen taken in the same locality is young, and agrees in most details with the type.

Remarks.—This species, *Sphenomorphus jagorii*, is terrestrial in habit and apparently is distributed throughout the Islands. Stejneger reports a specimen collected by McGregor on Calayan Island, north of Luzon. I found one at Baguio at an elevation of about 1,800 meters. In Mindanao it was very common, as it is in Mindoro and Sulu. These lizards seem to have no burrows but take refuge among rocks, under logs, etc. They are not especially difficult to capture. The young are frequently found in the neighborhood of water. The females lay eggs, but I have never been able to discover where they are placed.

SPHENOMORPHUS ATRIGULARIS Stejneger

Sphenomorphus atrigularis STEJNEGER, Proc. U. S. Nat. Mus. 34 (1908) 199, figs. 1, 2.

Description of species.—(From Stejneger.) “Snout short, obtuse; no supranasals; fronto-nasal broader than long, broadly

in contact with rostral, separated from frontal by prefrontals, which are broadly in contact; frontal almost triangular, pointed behind, not longer than fronto-parietals, much shorter than fronto-parietals and interparietal together; fronto-parietals separated by a suture; interparietal large, as wide as frontal, losenge-shaped, almost equilateral; parietals in contact behind interparietal; four supraoculars, subequal, the two anterior in contact with frontal; eight superciliaries; nostril pierced in nasal; a single frenal behind nasal; lower eyelid scaly; supralabials separated from eye by a row of small scales; fourth supralabial beneath center of eye; temporals not differentiated as shields, consisting only of ordinary cycloid scales but slightly larger than those on the back; no enlarged nuchals; ear-opening roundish, large, fully two-thirds the eye-opening; 30 smooth scales around the middle of the body; a pair

of enlarged preanals; legs weak and digits short; the distance between tip of snout and foreleg contained about once and one-half in distance between axilla and groin; hind leg slightly longer than distance from center of eye to foreleg, adpressed fore and hind legs fail to meet on the side of the body by more than the length of the foot; third toe almost as long as fourth; 10 smooth lamellæ under fourth toe; tail cylindric, slightly longer than head and body together, without enlarged scales underneath."

Color (in alcohol).—"Above chestnut brown, very indistinctly spotted with paler and darker brown; a well-defined blackish lateral band from eye to groin and continued behind thigh along the side of the tail, with small whitish spots and bordered above on neck and anterior half of back by a narrow pale brown band; lips, chin, throat, neck underneath and on the sides bluish black, the sutures more or less regularly edged with whitish; rest of underside and flank whitish, densely sprinkled with minute dark brown dots on sides, lower abdomen, underside of legs and tail; legs above dark brown, with small, pale spots."

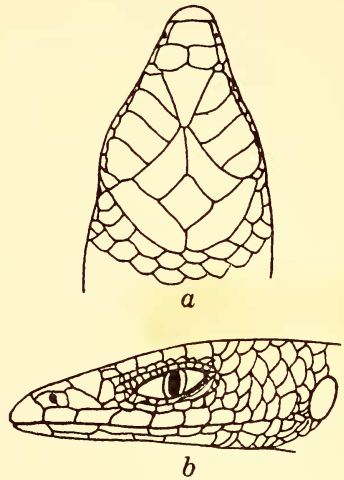


FIG. 29. *Sphenomorphus atrigularis* Stejneger; after Stejneger; a, head, dorsal view; b, head, lateral view; enlarged.

Measurements of Sphenomorphus atrigularis Stejneger.

| | mm. |
|---------------------|-----|
| Total length | 64 |
| Snout to vent | 31 |
| Snout to foreleg | 11 |
| Width of head | 5 |
| Axilla to groin | 16 |
| Vent to tip of tail | 33 |
| Foreleg | 6 |
| Hind leg | 9 |

Remarks.—The species is known by the unique type specimen, collected by Dr. E. A. Mearns, U. S. A., Malindang Mountain (338 meters altitude), Misamis Province, Mindanao, May 24, 1906.

In the collection which I made in the mountain near Zamboanga during the month of September, 1917, a specimen of what was very probably this species was captured. It agreed in having the lips and underside of head dark, and the frontoparietals divided. Unfortunately the specimen escaped from a faulty collecting bag. No other specimen was seen. The character of the temporals seems to differentiate this species from the many other small Philippine skinks. The species is very probably confined to western Mindanao.

SPHENOMORPHUS MINDANENSIS Taylor

PLATE 18, FIG. 1

Sphenomorphus mindanensis TAYLOR, Philip. Journ. Sci. § D 10 (1915) 99, pl. 1, figs. 1, 2.

Description of species.—(From the type, No. R1690, Bureau of Science collection; collected at Bunawan, Agusan, Mindanao, September, 1912, by E. H. Taylor.) · Head rather short, rostral small, much narrowed laterally in front of first labial; frontonasal broader than deep, forming a rather broad suture with rostral and a smaller suture with frontal; prefrontals about half the size of frontonasal, separated, not in contact with supraocular; frontal longer than wide, about equal in width to supraocular region, in contact with two supraoculars; frontoparietals large, distinct; interparietal large, the parietals forming a moderate suture behind it; nostril pierced in middle of nasal; two frenals, first as high as nasal and narrower, second slightly broader and lower than first; two unequal-sized preoculars between first superciliary and third labial, lower much the larger; a row of small suboculars separates labials from orbit; four large supraoculars, first longest, second widest, these

followed by small paired scales separating last supraocular from parietals; eight superciliaries, first larger than last supraocular, in contact with frontal; seven upper labials, sixth largest; a greatly enlarged temporal bordering parietal, in contact with four or five other enlarged temporals; six or seven lower labials; mental broader than rostral, not as deep as first post-mental, which is undivided and is followed by two pairs of divided chin shields, first of which is in contact, second separated by a single scale; a third pair separated from labials; thirty scale rows around body; sixty-six from occiput to above vent in longitudinal rows; two enlarged preanals; adpressed limbs barely touch; seventeen unicarinate lamellæ under fourth toe; diameter of eye equal to its distance from nostril; lower eyelid scaly; ear opening large, tympanum deeply sunk; tail tapering gradually, somewhat compressed.

Color in life.—Above light brown, mottled or spotted with lighter; a lateral dark brown band broken and intercalated with small light spots; tail light brown speckled with light color on sides; upper labials with light yellowish spots; entire ventral surface creamy white. Head finely reticulated with darker.

Measurements of Sphenomorphus mindanensis Taylor.

| | mm. |
|-----------------|------|
| Total length | 115 |
| Snout to vent | 48 |
| Tail | 67 |
| Width of head | 7 |
| Width of body | 8 |
| Axilla to groin | 25 |
| Foreleg | 10 |
| Hind leg | 15.5 |

Variation.—The cotype is a female containing two undeveloped eggs. The following variations obtain: The fourth supraocular is in contact with the parietal; the first scale following the fourth supraocular might also be regarded as a supraocular, as it is somewhat larger than in the type; the general color is a darker brown than the type. The tail is partly regenerated, and does not, even on the unregenerated part, show the lateral compression noticeable in the type. The median series of scales under the tail are widened normally, but on the regenerated tail

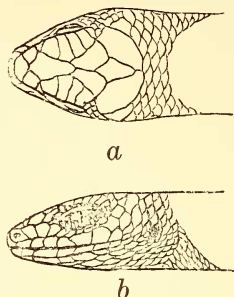


FIG. 30. *Sphenomorphus mindanensis* Taylor; a, head, dorsal view; b, head, lateral view; $\times 1$.

the scutes are transversely wider and more numerous. The measurement from snout to vent is 48 millimeters.

Remarks.—The type and cotype are from the low mountains near Bunawan, Agusan, Mindanao. Both are adult. The species is very rare in this locality, but may occur more frequently at higher altitudes. Only these two specimens known.

Genus *DASIA* Gray

Dasia GRAY, Ann. Nat. Hist. 2 (1839) 331; Cat. Liz. (1845) 108.

Keneuxia GRAY, Cat. Liz. (1845) 79.

Lygosoma sec. *Keneuxia* BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 211; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 198.

Legs well developed, pentadactyl, overlapping when adpressed; ear opening small; frontal narrower than supraorbital region; frontoparietals distinct; preanals numerous, small; lower eyelid scaly; digits compressed distally; supranasals present or absent.

There are two species of *Dasia* found in the Philippines, both of which are widely distributed forms that vary greatly among themselves. One, *Dasia smaragdinum*, has a number of recognized subspecies; the other, *Dasia olivaceum*, which also has much variation, has had no subspecies recognized by the most recent herpetologists.

Peters described a form from Mindanao, under the name of *Euprepes (Tiliqua) semicinctus*. This form shows differences which distinguish it markedly from the typical *Dasia olivaceum* (Gray). Gray described a form which he called *Tiliqua grisea*. In 1915 I described a species from Palawan under the name of *Dasia griffini*. A careful review of the specimens in the Bureau of Science collection and in my own collection, and a review of the literature on the species has caused me to regard these forms as subspecies of *Dasia olivaceum*. There are no distinctive variations in the scalation of the head, but there are differences, in color and markings and in the number of scale rows, which warrant separation. In consequence I shall consider two subspecies under this species: *Dasia olivaceum semicincta* (Peters), and *Dasia olivaceum griffini* Taylor.

DASIA OLIVACEUM (Gray)

Dasia olivacea GRAY, Ann. Nat. Hist. 2 (1838) 331; Cat. Liz. (1845) 108.

Euprepes ernestii DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 696; CANTOR, Cat. Mal. Rept. (1843) 47.

Tiliqua grisea GRAY, Cat. Liz. (1845) 110.

- I recognize two forms of *Dasia olivaceum* in the Philippine fauna worthy of subspecific rank. In a former paper both were given specific rank. This I now believe is not warranted.

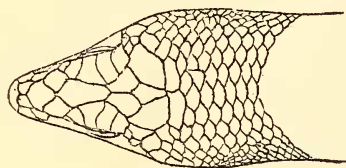
D. o. griffini Taylor (p. 204).

It is not improbable that the second form is equivalent to *Tiliqua grisea* Gray.

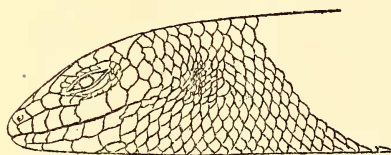
PLATE 19, FIG. 2

- Description of subspecies.*—(From No. 685, E. H. Taylor collection; collected at Bunawan, Agusan, 1913, by E. H. Taylor.) Head narrowed much in front of eyes, rounding across canthus rostralis; rostral large, high, its upper outline circular; supranasals present, in contact medially, slightly shorter than nasals; frontonasal large, slightly broader than long, in contact with anterior frenal, supranasals, prefrontals, and frontal; prefrontals touch two frenals, first superciliary, and first supraocular, not in contact with each other; frontal much narrower than supraocular region, twice as long as wide, extending more anteriorly than first supraocular, in contact with two supraoculars; frontoparietals separate, forming a suture more than half their

length; interparietal shaped like frontal but much smaller; parietals rather small, broader than long, not forming a suture behind interparietal; a pair of nuchals present; nasal pierced in a rectangular nasal; no postnasal; anterior frenal slightly smaller than posterior; two preoculars, upper very small; lower large, followed by another scale similar in shape; seven superciliaries, first and last largest; four supraoculars, first smallest, second broadest and longest; three slightly enlarged temporals; eight



a



b

FIG. 31. *Dasia olivaceum semicincta* (Peters); a, head, dorsal view; b, head, lateral view; $\times 1$.

upper labials, fifth largest, fifth and sixth below orbit, separated from it by a row of scales, very small anteriorly, larger posteriorly; second and third labials higher than fourth; mental large, extending back farther than rostral; postmental wider than deep, touching two lower labials; three pairs of chin shields slightly broader than deep, in contact; second pair slightly larger, separated by a single scale; third pair small, separated by five scales; six lower labials; limbs well developed; adpressed hind leg reaches

to near elbow of adpressed foreleg; digits slightly widened at base, compressed distally; above base of toes scales in two rows, distally covered by single plates; twenty smooth lamellæ under fourth toe which is but little longer than third; two slightly enlarged heel plates; about ten preanal scales bordering anus; scales in thirty rows about body; scales on head, neck, and under-side of body and limbs smooth; scales keeled on back, keels growing more distinct and pronounced posteriorly; upper-limb scales strongly keeled; tail partially regenerated; regenerated portion with a broadened upper and a lower row of scales and a single small lateral row on each side; eye nearer end of snout than ear opening; latter very small with projecting lobule, nearer foreleg than end of snout.

Color in life.—Above brownish olive, the scale edges slightly darker, with six vertical bars of black from axilla to groin, extending from abdomen to back but not meeting medially; slightly lighter olive gray above hind legs; a few ocellated spots on unregenerated portion of tail, below bluish gray; head without spots.

Measurements of Dasia olivaceum semicineta (Peters).

| | mm. |
|--------------------------------|-----|
| Total length, tail regenerated | 240 |
| Tail | 110 |
| Snout to vent | 130 |
| Snout to foreleg | 46 |
| Snout to ear | 25 |
| Axilla to groin | 60 |
| Width of head in front of eye | 12 |
| Width of head at ear | 20 |
| Depth of head in front of eye | 11 |
| Depth of head at ear | 17 |
| Foreleg | 35 |
| Hind leg | 46 |

Variation.—Two specimens, one from Mindanao and one from Mindoro, have twenty-eight scale rows; in a single specimen the prefrontals are barely in contact; the lamellæ vary between nineteen and twenty-one. In different-aged specimens the color and markings vary strikingly.

Young (extreme tip of tail regenerated.)—Length, 132 millimeters. The body above is glossy coal black with a series of brilliant orange yellow bars from the tip of the snout to the end of the tail; there are three bars in front of the eye, the first on rostral; two bars in front of eye; two bars between the eyes, having only a single representative below the eye; the sixth bar lies across the occipital region passing through the corners of the mouth; two or three bars across the neck; six on the body in front of the hind leg, with thirteen much wider bars on the tail; the latter bars are more orange than yellow; the legs and digits barred with canary yellow; the regenerated tail is brick red; below, on body the bars widen and lose themselves in the immaculate canary yellow of the abdomen, giving the appearance ventrally of a series of black belts, the ends of which are pointed and fail to meet. In a specimen 180 millimeters long (snout to vent, 76 millimeters), these markings are still very distinct, but the colors are brownish, the bars very narrow; however, in a specimen measuring from snout to vent 92 millimeters (tail broken and regenerated), the characteristic markings of the young are scarcely distinguishable, save for a series of lateral bars of ocellated black and cream, scarcely traceable dorsally. These are the remains of the bars across the body of the young. Below, bluish yellow. In a large adult, 275 millimeters long, the color is olive brown above with a series of lateral bars of ocellated scales, widely separated from their fellows dorsally. Traces of annulations are visible on the tail;

bluish beneath. Other specimens agree with these in markings and coloration, according to their age.

Remarks.—This species is retiring and is seldom observed. It is arboreal in habit, feeding for the most part in the trees. Usually the animals inhabit trees which are densely covered with vines. I had resided at Bunawan, Agusan, nearly a year and a half before specimens of this species were taken, and then they were discovered in a small clump of trees about 200 meters from my house. Several specimens were taken.

DASIA OLIVACEUM GRIFFINI Taylor

PLATE 19, FIG. 1

Dasia griffini TAYLOR, Philip. Journ. Sci. § D 10 (1915) 104, pl. 1, figs. 5, 6.

? *Tiliqua grisea* GRAY, Cat. Liz. (1845) 110.

Description of species.—(From the type, No. 1777, Bureau of Science collection; collected at Taytay, Palawan, by L. E. Griffini.) Rostral rather small, wider than high, the posterior aspect curved; supranasals present, distinctly smaller than nasals; prefrontals smaller than in *D. semicincta*, separated narrowly; frontonasal broader than deep, touching one frenal; frontal elongate, more than twice as long as wide; in contact with three supraoculars; frontoparietals distinct, forming a suture about half their length; interparietal similar to frontal in shape, smaller; parietals wider than long; one pair of nuchals; nostral pierced in a single nasal, followed by two frenals, second largest; two preoculars between first superciliary and fourth labial, upper very small, lower followed by a similar-sized scale; seven upper labials, fifth and sixth below eye; second and third slightly higher than fourth; seven superciliaries; seven lower labials; mental extending slightly farther posteriorly than rostral; one undivided postmental; two pairs of chin shields, first pair largest, in contact; second pair separated by a single scale; third pair no larger than scales on throat; limbs well developed; hind leg fails to reach wrist of adpressed foreleg; nineteen lamellæ under fourth toe, which is only slightly longer than third; digits widened slightly at base, compressed distally; two well-devel-

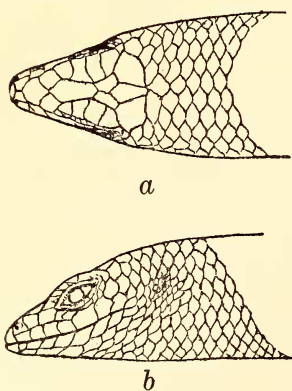


FIG. 32. *Dasia olivaceum griffini* Taylor; a, head, dorsal view; b, head, lateral view; $\times 1$.

oped heel plates; preanal scales slightly differentiated, eight bordering anus; twenty-six scale rows around body, slightly keeled on posterior part of back, and above tail and limbs; median scales under tail widened; ear opening small with lobules, nearer foreleg than end of snout.

Color in alcohol.—Greenish drab with a series of fifteen broken, transverse, brownish black bars crossing body from head to tail; tail indistinctly mottled; tip of tail, regenerated, light gray; only slight indications of ocelli; belly grayish blue.

Measurements of Dasia olivaceum griffini Taylor.

| | mm. |
|---------------------------------------|-----|
| Total length, tail partly regenerated | 224 |
| Snout to vent | 111 |
| Snout to foreleg | 41 |
| Tail | 113 |
| Axilla to groin | 58 |
| Width of head, in front of eye | 9.5 |
| Depth of head, in front of eye | 8 |
| Width of head, at ear | 18 |
| Depth of head, at ear | 16 |
| Foreleg | 30 |
| Hind leg | 39 |

Variation.—The two cotypes agree very well with the type in scalation, but differ somewhat in markings and coloration; the transverse bars are dim, but the markings on the parietals and on supraoculars are present (also present in the type); the ground color is darker.

These three specimens are from Palawan, where they were collected by Dr. L. E. Griffin, for whom the species is named.

DASIA SMARAGDINUM (Lesson)

PLATE 20, FIGS. 1 TO 3

Scincus smaragdinus LESSON, Voy. Coquille, Zool. 2 (1830) 43, pl. 3, fig. 1; SCHLEGEL, Abbild. 33, pl. 11.

Scincus viridipunctus LESSON, Voy. Coquille, Zool. 2 (1830) 44, pl. 4, fig. 1.

Scincus coelestinus GUÉRIN, Icon. Reg. Anim. Rept. pl. 15, fig. 2.

Keneuxia smaragdina GRAY, Cat. Liz. (1845) 79.

Lygosoma smaragdina DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 738.

Lygosoma smaragdinum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 250; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 199–201 (four subsp.).

Lygosoma (Hinulia) smaragdinum var. *viridifuscum* PETERS, Mon. Berl. Ak. (1872) 776.

Lygosoma (Keneuxia) smaragdinum PETERS and DORIA, Ann. Mus. Genova 13 (1878) 345.

Lygosoma acutirostre OUDEMANS, in Semons Zool. Fors. Aust. 5 (1894) 141.

Dasia smaragdinum BARBOUR, Proc. Biol. Soc. Washington 24 (1911) 16; Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 91, pls. 1, 2 (three varieties); TAYLOR, Philip. Journ. Sci. § D 12 (1917) 373; § D 13 (1918) 253, pl. 3.

Description of species.—(From No. 657, E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, 1912, by E. H. Taylor.) Rostral low, wider than deep; no supranasals; fronto-nasal as long as broad, anterior border convex, forming a wide suture with rostral; prefrontals very large, in contact medially; frontal longer than its distance to end of snout, longer than the combined parietal length; frontoparietals short, distinct, in contact; interparietal small; parietals forming a suture behind latter; three pairs of nuchals, nostril pierced in a single un-

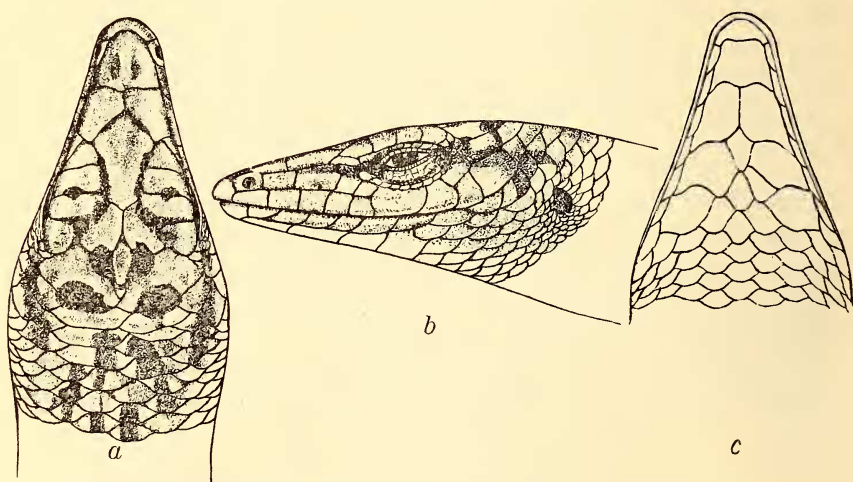


FIG. 33. *Dasia smaragdinum* (Lesson); a, head, dorsal view; b, head, lateral view; c, chin; $\times 2$.

divided nasal; latter followed by two elongate frenals; four supraoculars, the first three bordering frontal; nine superciliaries, first two large, the others small; nine upper labials, sixth very wide below eye; two much-enlarged temporals; seven lower labials; postmental at least three times size of mental; three pairs of chin shields, two pairs in contact; eye moderately large, lower eyelid scaly; ear opening small, with anterior lobules projecting; eye nearer ear than end of snout; ear nearer foreleg; twenty-four rows of scales around body, smooth, dorsals enlarged; preanals slightly enlarged; scales at base of tail very small with a transversely dilated row under remainder; limbs

strong, well developed; adpressed hind limb reaches elbow; digits compressed, fourth toe with thirty-three smooth lamellæ below; an enlarged heel plate.

Color in life.—Anterior part of body bluish green with slight wash of brownish dorsally, the edge of each scale narrowly edged with dark brown; head the same except labials, which are very light greenish white; posterior part of body brown with small, light greenish spots surrounded by darker brown; tail except at base greenish; legs brown spotted with greenish; below greenish to yellowish white; underside of tail greenish; an indistinct dark stripe behind hind leg continued a short distance on tail.

Measurements of Dasia smaragdinum (Lesson).

| | mm. |
|------------------|-----|
| Total length | 270 |
| Snout to vent | 98 |
| Snout to foreleg | 41 |
| Tail | 172 |
| Foreleg | 34 |
| Hind leg | 44 |

Variation.—This species is a variable one. There are at least four recognized subspecies, three of which are admirably figured by Barbour.* In the Philippines the variations noted do not appear to be geographical, as two or more variations may be found in the same immediate locality. The following localities are represented: Palawan, three specimens; Negros, two; Mindoro, one; Luzon, one; Mindanao, fifteen.

Two color forms are present in the Palawan specimens. Two of the specimens are bluish with a darker wash (in alcohol), with numerous quadrangular dark spots on back and a dim, elongate, V-shaped, darker spot on base of tail, and numerous milky blue spots are scattered on side and back. The second form has a greenish blue neck and the shoulders with quadrangular black spots; back with brownish wash and whitish dots; V-shaped mark present; a dark line along groin continuing on tail; a distinct dark line from snout to ear.

The Mindoro specimen resembles the second Palawan form, but the quadrangular marks on neck are wanting and there is a series of spots on first half of tail.

The two Negros specimens differ; the one has black quadrangular spots over a greenish background, and the tail is light greenish brown with no spots; and the other has a few small

* Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 91, pl. 1, 2.

spots on neck, with body and tail gray-brown with white punctations.

The Luzon specimen is uniform gray-blue with no evidence of markings of any sort.

The Mindanao specimens form two groups; two specimens are grayish green (in life) with extremely numerous, large, quadrangular black spots arranged in irregular rows, which continue almost to end of tail; a lateral light streak along side of body and tail, resembling somewhat Barbour's variety *D. s. moluccanum* or de Rooij's *D. s. celebense*. Eight specimens have the neck greenish, the scales dark-edged, a brown wash on the back, and a green tail; of these eight, six have greenish white spots dorsally, the other two are without them. Four specimens in the lot are embryos and, unlike young specimens studied by Barbour, they show markings similar to those on adults. One pair of eggs found buried in a mass of arboreal plant roots contained fully developed embryos resembling the two forms above described, which led me to believe the color variation in the Mindanao forms might be a sexual variation. At any rate, I believe it impossible at present to relegate Philippine material to subspecies, at least until a more complete series from more localities is in hand.

Remarks.—A common species, strictly arboreal; however, it sometimes descends to the ground to feed. The eggs are usually deposited in decaying wood about roots of arboreal plants, or the stumps of rotting branches. They may be recognized by their longitudinal striations. The species was present also on the islands of the Sulu Archipelago.

Genus **LEIOLOPISMA** Duméril and Bibron

Leiopisma DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 742.

Leiopisma FITZINGER, Syst. Rept. (1843) 22.

Lampropholis FITZINGER, Syst. Rept. (1843) 22.

Mococa GRAY, Cat. Liz. (1845) 80.

Lipinia GRAY, Cat. Liz. (1845) 84.

Oligosoma GIRARD, Proc. Acad. Nat. Sci. Philadelphia (1857) 196.

Liopisma PETERS, Mon. Berl. Ak. (1864) 387.

Lygosoma sec. *Liopisma* BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 211.

Legs well developed, usually pentadactyl; the length of the hind limb exceeds the distance between the center of the eye and the forelimb; lower eyelid with an undivided transparent

or opaque disk; tympanum distinct; no supranasals; rostral usually forming a suture with the frontonasal; frontal not broader than the supraocular region; one or more pairs of enlarged nuchals.

This genus does not differ widely from the genus *Siaphos*; and two species here described, *Siaphos auriculatum* Taylor and *Siaphos kempi* Taylor, rather join the two groups. *Siaphos* is usually characterized by the more-reduced limbs, the minute ear, and the very small, or absent, prefrontal. In *S. auriculatum* the ear is large, the prefrontals are wanting, and the legs are moderate. In *S. kempi* the prefrontals are fairly large, the limbs barely meet, and the ear is well developed. Superficially they resemble each other, especially in color and markings. It is highly probable that other intermediate species are present in the Islands.

Key to the Philippine species and subspecies of Leiolopisma Duméril and Bibron.

*a*¹. Digits distinctly dilated; 4 supraoculars; 24 scale rows; 4 short dark stripes from head to some distance on body.

L. semperi (Peters) (p. 209).

*a*². Digits not distinctly dilated.

*b*¹. Four supraoculars; 30 scale rows; a lateral specked brown streak from eye to tail..... *L. vulcanium* (Girard) (p. 211).

*b*². Five supraoculars; 24 scale rows; a median golden streak from head to tail..... *L. pulchellum* (Gray) (p. 212).

*b*³. Six supraoculars; 22 scale rows.

L. pulchellum grande Taylor (p. 214).

LEIOLOPISMA SEMPERI (Peters)

Lygosoma (Lipinia) semperi PETERS, Mon. Berl. Ak. (1867) 18.

Lygosoma semperi BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 254.

Description of species.—(Described from thirteen specimens from E. H. Taylor collection; collected at Bunawan, Agusan, Mindanao, 1912–1913, by E. H. Taylor.) Body rather slender, with a long pointed snout; rostral large, covering entire point of snout, which is very much flattened; no supranasals; frontonasal very large, about as broad as long, broadly in contact with rostral and nasals and narrowly touching frontal (three specimens have the frontal separated from frontonasal); prefrontals present, quadrangular, usually separated, narrowly touching both frenals, always in contact with the first supraoculars; frontal very elongate, at least equal to its distance from end of snout, its anterior end farther forward than supraocular region, its

posterior reaching back beyond middle of supraocular region, not as wide as supraocular region; frontoparietals distinct, longer than wide; interparietal moderate, as wide as frontal; parietals large, forming a broad suture behind interparietal; four supraoculars, anterior elongate, cone-shaped, second widest; nasal longer than high, the nostril pierced near the middle; two frenals, much longer than high; two subequal preoculars; seven upper labials, fifth and sixth bordering orbit; five to seven lower labials; four or five rather enlarged temporal scales; mental larger than rostral, followed by one unpaired postmental and three paired chin shields, only first pair in contact, second separ-

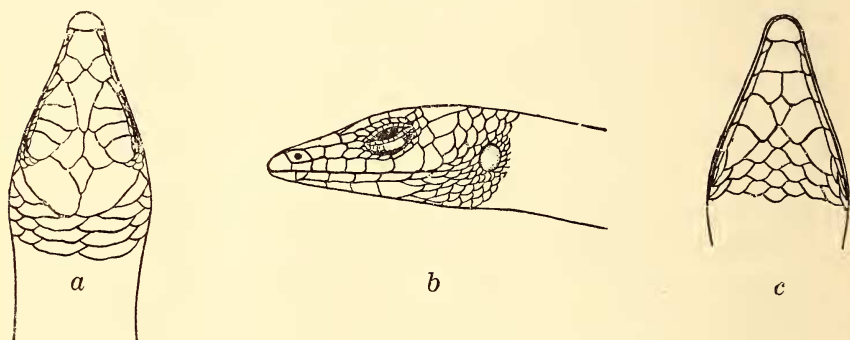


FIG. 34. *Leiolopisma semperi* (Peters); a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

ated by one scale; four or five pairs of nuchals; eye moderate, larger than auricular opening, a little closer to latter than tip of snout; no lobules on anterior border of auricular opening; lower eyelid with a transparent disk; twenty-four scale rows around body, dorsals largest; adpressed hind leg scarcely reaches wrist of adpressed foreleg; fourth toe distinctly longer than third; digits rather flattened on basal portion and compressed on distal portion, about twenty-four lamellæ below, the sixteen basal lamellæ padlike; tail cylindrical, tapering to a point; preanals distinctly enlarged.

Color in life.—Above brownish olive to golden brown, with two broad black-brown lines beginning at the supraocular region which continue a short distance, then gradually narrow and almost wholly disappear, or continue as minute dotted lines to some distance on tail; two other brown lines begin on tip of snout, and continue through eye, above ear and arm; then they narrow to dotted lines on sides; lower surfaces greenish, usually brilliantly iridescent.

Measurements of Leiopisma semperi (Peters).^a

| | mm. |
|-----------------------------------|------|
| Total length, tip of tail missing | 115 |
| Tip of snout to vent | 46 |
| Tip of snout to foreleg | 17 |
| Axilla to groin | 26 |
| Foreleg | 13 |
| Hind leg | 18.5 |

^a From No. 716 E. H. Taylor collection.

Remarks.—This species is common in western Mindanao, living in old stumps and hollow trees, rarely concealing itself under vines and leaves as does *L. pulchellum*, and is very much more shy and retiring. Females give birth to two young at a time. The markings on the embryos of 35 millimeters are practically identical with those in the adults; the largest specimen, a gravid female, measures 50 millimeters from snout to vent.

The species was founded on three specimens collected in Mindanao by Semper, and a fourth, young, specimen from Camiguin.* It is confined to the Philippines and known only from the type localities and Bunawan, Agusan, Mindanao.

LEIOLOPISMA VULCANIUM (Girard)

Lipinia vulcania GIRARD, Proc. Acad. Nat. Sci. Philadelphia (1857) 196; U. S. Explor. Exped., Herp. (1858) 254.

Lygosoma vulcanium BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 255; Trans. Zool. Soc. London 12 (1886) 42.

Description of species.—(After Girard.) Head depressed, rather subconcave in interocular region; snout short, subacute, declivous; rostral widened; no supranasals; frontonasal quite large, subquadrangular, forming a broad rostral suture; prefrontals large, subrhomboid, in contact medially; frontal elongate, sublanceolate, tapering behind to an acute angle, extending back beyond middle of supraocular region; frontoparietals and interparietal distinct; parietals forming a suture behind interparietal; four supraoculars, first and fourth longest, second and third broadest; nostril pierced in middle of nasal; latter followed by two vertical elongated frenals; six upper labials, third, fourth, and fifth bordering orbit; four lower labials; mental moderate; temporals slightly enlarged, that bordering parietals largest; two subequal preoculars; ear opening large, subcircular, without lobules, tympanum somewhat sunk, though

* Probably the island off the north coast of Mindanao by that name.

visible; thirty scales around middle of body, smooth, subequal, rather smaller on flanks; two large preanals; legs slender, rather weak, not meeting when adpressed; digits slender, compressed, with large smooth lamellæ beneath; tail as long as head and body.

Color.—Light brownish above, with darker specks; head uniform brown; a lateral dark brown streak, interrupted or speckled with whitish or yellowish, extends from eye to a certain distance along tail; lower surface light uniform brown.

Remarks.—The type specimen (which is the only one known) was discovered at Caldera, Zamboanga, Mindanao, by the Wilkes Exploring Expedition. Unfortunately Girard failed to append measurements of the type specimen to his description. Quite probably it is a diminutive species, as most of the other members of the genus are small. In a recent collecting trip in Zamboanga I failed to obtain any trace of this species of *Leiopisma* or of the two other species known from Mindanao.

LEIOLOPISMA PULCHELLUM (Gray)

PLATE 15, FIG. 5

Lipinia pulchella GRAY, Cat. Liz. (1845) 84.

Euprepes pulchellus STEINDACHNER, Novara Rept. (1869) 48.

Lygosoma pulchellum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 254, pl. 17, fig. 1.

Description of species.—(Described from thirteen specimens from Mindanao and Luzon.) Head elongate, snout pointed and much flattened, rather wedge-shaped; rostral large, covering entire point of snout; frontonasal large, wider than deep, broadly in contact with rostral, touching nasal and anterior frenal, widely separated from frontal; prefrontals large, longer than wide, broadly in contact medially; interocular region extremely narrow; frontal as long as, or longer than, its distance from end of snout, very much narrowed behind for nearly one-half its length, in contact with three or four supraoculars (one specimen has only two in contact); five supraoculars; frontoparietals narrow and elongate, with a moderate suture; interparietal as large and wide as anterior part of frontal, larger than frontoparietal; parietals forming a suture; four or five pairs of nuchals; no supranasals; nostril pierced in nasal; two frenals longer than high; two preoculars, lower much the larger; eight or nine superciliaries; temporals much enlarged; seven upper labials, fifth below eye; mental larger than rostral; five or six lower labials; auricular opening large, tympanum not deeply sunk; eye large with a transparent disk on lower eyelid; eye

nearer ear than end of snout; limbs long, hind limb reaches axilla; digits long and slender, compressed distally, fourth toe much longer than third; subdigital lamellæ smooth, very uneven in size and shape, twenty-three to twenty-five under fourth toe; two enlarged preanals; twenty-four smooth scales around body, the median dorsal rows much enlarged; scales under tail broadened.

Color in life.—A median golden yellow stripe runs from snout to end of tail, bordered laterally by two equally broad, black-brown bands which stop at base of tail or continue only a short distance; dorsolaterally a wider brownish stripe from eye to end of tail, with small irregular flecks of yellowish and bordered below with a dark black-brown line from eye to groin; upper part of limbs brown with dark spots; digits barred with dark brown and yellowish; below, iridescent greenish white; labials with dark spots.

Measurements of Leiopisma pulchellum (Gray).

| | mm. |
|------------------|------|
| Length | 108 |
| Snout to vent | 41.5 |
| Tail | 66.5 |
| Axilla to groin | 21 |
| Snout to foreleg | 16 |
| Foreleg | 16 |
| Hind leg | 20 |

Variation.—The nine specimens from Mindanao are lighter in color than the Luzon specimens, and the two bands bordering the golden streak are much narrower and very much lighter brown; the second lateral dark streak from eye to groin is wanting; the tail is much lighter, almost wholly yellow on the posterior half; they have five supraoculars, three (in one specimen four) touching the frontal; the first superciliary is fairly large, separated from frontal. The interparietal is usually wider than the frontal. The Luzon specimens, three from Mount Mari-vels, and one from Albay, all have distinct brown lines from eye to groin dorsolaterally; the sides of the tail are brown almost to the end; the blackish stripes bordering the median light stripe are wider; there are usually four supraoculars; one specimen has the anterior broken, forming five; that touching the prefrontals smallest.

The measurements of No. 735, E. H. Taylor collection, the largest Mindanao specimen, are given. The largest Luzon specimen measures 100 millimeters in length and 41.5 from snout to vent.

Remarks.—Lizards of this species, unlike *L. semperi*, lay eggs, usually two in number. They are common in the Agusan Valley. They are not shy, and can be seen crawling about over tree trunks, near their base, sometimes as many as half a dozen on a single tree. On approach they frequently put themselves in an attitude of defense, twisting their tails slowly about over their backs and pirouetting about as if intending to attack. I have found them rather common in similar habitats near the base of Mount Maquiling, Laguna.

The type specimen was collected by H. Cuming, the exact locality unknown. I surmise that it was taken in Luzon as the drawing of the type by Boulenger shows the presence of the lateral stripe and only four supraoculars.

LEIOLOPISMA PULCHELLUM GRANDE Taylor

Leiolopisma pulchellum grande TAYLOR, Philip. Journ. Sci. § D 12 (1917) 374.

Description of subspecies.—(From the type, No. 899, E. H. Taylor collection; collected on Canlaon Volcano, December 22, 1915, elevation 900 meters, by E. H. Taylor.) Head less pointed

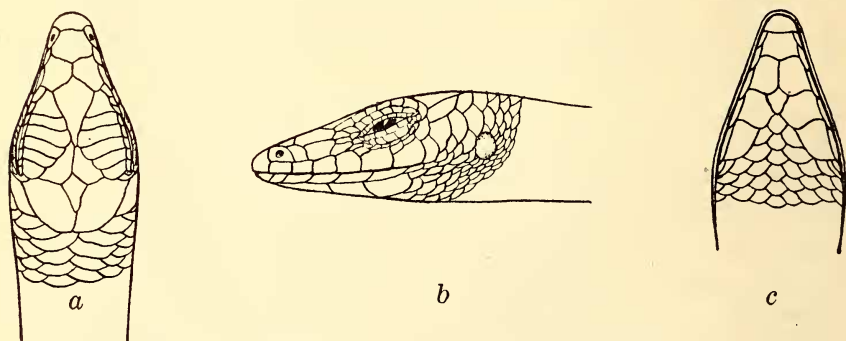


FIG. 35. *Leiolopisma pulchellum grande* Taylor; a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

than *L. pulchellum* and not narrowed and flattened so abruptly in front of eyes; distance between nasals proportionately less; rostral broadly visible above, the length above much greater than height of snout; frontonasal large, not rectangular in shape, but distinctly rounding in front; prefrontals almost as large as frontonasal, forming a median suture about one-third of their greatest length; frontal twice as long as wide, narrowed to a long point behind; frontoparietals distinct, their suture much larger than in *L. pulchellum*; parietals moderate, inclosing an elongate interparietal; nasal large, pierced by nostril; no supranasals; first

frenal distinctly higher than nasal, higher but much smaller than second frenal; two preoculars, lower the larger; nine superciliaries, none in contact with frontal; six supraoculars, last as wide as first, third widest, four in contact with frontal; seven upper labials, first three elongate, of nearly equal size and shape, last four higher; a scale partly inserted between fourth and fifth, and fifth and sixth labials; five or six enlarged temporals; lower eyelid with an undivided transparent disk; auricular opening two-thirds as large as eye; six lower labials, all narrow and elongate; two undivided postmentals, first small (the small one absent in the cotype); two very much enlarged preanals, which are preceded by three or four enlarged body scales; twenty-five lamellæ under fourth toe; twenty-two scale rows about body; three or four pairs of nuchals present; foreleg reaches forward to nostril; hind leg fails to reach axilla by a considerable distance.

Color in life.—Dark, mottled brown above with a greenish bronze dorsal streak; dark spots on parietal region; supraoculars each with an indistinct lighter line; labials spotted with dark; laterally flecked with light spots of bronze-greenish tint; chin, throat, belly, and underside of tail an immaculate, iridescent greenish color with a wash of bright canary; arms and legs spotted with minute lighter dots; tail above spotted with brownish spots, with trace of a median streak.

Measurements of type of Leiolopisma pulchellum grande Taylor.

| | mm. |
|--------------------------------|-----|
| Total length, end of tail lost | 67 |
| Snout to vent | 42 |
| Snout to ear | 10 |
| Snout to insertion of foreleg | 18 |
| Axilla to groin | 22 |
| Foreleg | 15 |
| Hind leg | 19 |
| Width of head | 6.5 |

Variation.—The cotype varies in not having the frontal narrowed so quickly as in the type, and the interparietal is shorter.

Remarks.—This form differs from *L. pulchellum* in the larger number of supraoculars, the shape of the head, and the shorter hind leg, which does not reach the axilla; the frontal touches four instead of three supraoculars, the interparietal is very much smaller and narrower than the frontal. There are two scale rows less around the body. It apparently grows to a larger size. I have ten typical specimens of *L. pulchellum* for com-

parison; it is usually shorter, with narrower head and body, the median streak brilliant golden yellow, and the tail brownish yellow with the markings almost totally disappearing.

Only two specimens of the present subspecies were taken, both in the same immediate locality on Mount Canlaon.

Genus SIAPHOS Gray

Siaphos GRAY, Cat. Liz. (1845) 72, 88.

Lygosoma, part., BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 223.

Legs only very moderately developed; lower eyelid scaly or with a transparent disk; ear covered with scales or tympanum unscaled; no supranasals; nuchals present (in Philippine species); prefrontals either well or moderately developed, sometimes wanting; frontal not broader than supraocular region; species small.

Four species are known to occur in the Philippines.

Key to the Philippine species of Siaphos Gray.

*a*¹. Lower eyelid with a transparent disk.

*b*¹. Prefrontals present, moderately large.

*c*¹. Auricular opening distinct; limbs barely touch when adpressed, olive brown above with a broad, darker, lateral stripe.

S. kempi Taylor (p. 216).

*c*². Auricular opening hidden; limbs usually touching when adpressed; light brown with 4 blackish stripes on back.

S. infralineolatum (Günther) (p. 218).

*b*². Prefrontals wanting. Auricular opening large; limbs fail to touch when adpressed; olive brown above with a median brownish stripe, and 2 broad, brown, lateral stripes... *S. auriculatum* Taylor (p. 221).

*a*². Lower eyelid scaly; auricular opening concealed; 4 blackish stripes on body..... *S. quadrivittatum* (Peters) (p. 223).

SIAPHOS KEMPI Taylor

Siaphos kempi TAYLOR, Philip. Journ. Sci. 14 (1919) 118.

Description of species.—(From the type, No. 2,006 E. H. Taylor collection; collected at Lake Naujan, Mindoro, April 23, 1916, by E. H. Taylor.) Head short; snout blunt, not especially depressed; rostral covering tip of snout, the part visible above much less than depth of snout at posterior border of rostral; no supranasals; frontonasal large, the suture with rostral equal to or smaller than that with nasal and slightly larger than that with frontal; prefrontals much reduced, separated, not in contact with first supraocular; frontal moderate, about equal to frontoparietal in length, as long as its distance from end of snout, in contact with two supraoculars and first superciliary; fronto-

parietals fused in a single scale, a little broader than long; interparietal triangular, a little wider than frontal but shorter; parietals forming a suture behind interparietal; four pairs of nuchals; nasal pierced medially by nostril, touching a single labial; two frenals, both higher than wide; four supraoculars, last longest, second widest; eight superciliaries; several much-enlarged temporals; seven upper labials, fifth below center of eye; five or six lower labials; mental larger than rostral; ear opening obliquely oval, moderately large; eye nearer tip of snout than ear opening; limbs small, barely touching when adpressed; digits not or but slightly compressed; twenty lamellæ under

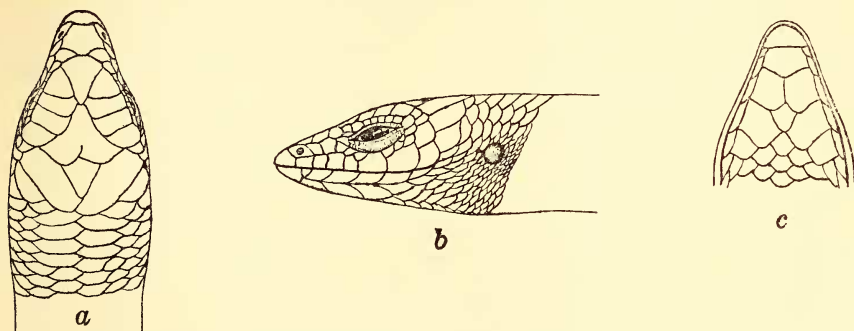


FIG. 36. *Siaphos kempi* Taylor, from the type; a, head, dorsal view; b, head, lateral view; c, chin; $\times 4$.

fourth toe; two enlarged preanals; median row of scales under tail slightly widened; twenty-two rows around body; scales smooth, the median dorsal rows widest.

Color in life.—Above silvery olive to brown, somewhat lighter on tail; laterally a broad dark stripe from eye to near end of tail, becoming a somewhat lighter color on tail, bordered above and below with a narrow, greenish silver line; head uniform dark brown; belly dirty greenish white with a few small specks of dark color under chin; under part of tail creamy white; limbs mottled brown and yellowish.

Measurements of Siaphos kempi Taylor.

| | mm. |
|------------------|------|
| Total length | 93 |
| Tail | 53 |
| Axilla to groin | 21 |
| Snout to vent | 40 |
| Snout to foreleg | 14.5 |
| Foreleg | 9 |
| Hind leg | 14 |

Variation.—Two other specimens were taken in the same locality, both agreeing with the type in color and markings, save that both are lighter above; they are practically identical in scalation.

Remarks.—This species appears rather intermediate between *Leiopisma* and *Siaphos*. I have referred it to the latter rather than to the former group because of its closer superficial resemblance to the other Philippine members of that genus and the reduction of the prefrontals and limbs; the ear opening however is large and distinct. The known Philippine species of *Leiopisma* have the divided frontoparietal; the three known species of *Siaphos* have the frontoparietal single.

The species is named for Ollie C. Kemp, Mangyan Agent in Mindoro, who accompanied me on the collecting trip to Lake Naujan and assisted in making collections.

The species was found living under the leaves of small, close-clinging vines on trees. When these vines were loosened at the base of the tree and torn down, the lizards were revealed on the side of the tree at some distance from the ground, and they immediately took refuge much higher up in the tree. Thus many of the specimens seen escaped. Only three, brought down with the vines, were captured.

This species differs quite markedly from the two small species, *Siaphos infralineolatum* (Günther) and *Siaphos quadrivittatum* (Peters) in size, markings, and the presence of an auricular opening. From the recently described *Siaphos auriculatum* Taylor, which it resembles greatly in marking, it differs in the presence of small prefrontals, and it probably does not grow to so large a size. Many other differences are obvious on a comparison of descriptions and figures. Known only from the type locality.

SIAPHOS INFRALINEOLATUM (Günther)

PLATE 15, FIG. 3

Cophoscincus infralineolatum GÜNTHER, Proc. Zool. Soc. London (1873) 166.

Cophoscincus subvittatus GÜNTHER, Proc. Zool. Soc. London (1873) 167.

Lygosoma infralineolatum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 328, pl. 27, fig. 1; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 269.

Description of species.—(Described from fifty-two specimens from Bunawan, Agusan, Mindanao, and various islands of the Sulu Archipelago.) Head rather short, rather sharply pointed;

rostral covering point of snout, the part visible above not longer than its height; sutures with frontonasal not longer than those with nasal; frontonasal as wide as deep or wider, in contact with one frenal laterally, forming its shortest suture with frontal, its longest with prefrontals (in one specimen the frontal suture is much widened, and the frenal suture is shorter); prefrontals well developed, invariably separated, touching two frenals laterally; frontal narrower than supraocular region, as long as its distance to end of snout, narrowly truncate in front, much narrowed behind; four supraoculars, first and fourth longest, second widest; frontoparietal very large, single, a little broader than long, much broader than frontal or supraocular region; interparietal usually triangular, the parietals forming a suture behind it; three to five pairs of nuchals; nostril pierced in a single nasal, followed by two frenals, anterior a little higher than wide, posterior broader than anterior; two preoculars,

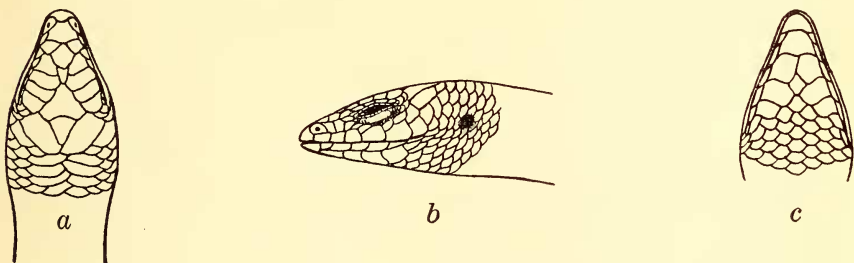


FIG. 37. *Siaphos infralineolatum* (Günther); a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

lower largest; nine to eleven superciliaries; several enlarged temporals, largest bordering parietal; six upper labials, fourth and fifth under eye, fourth alone entering orbit; two scales above third labial, and a scale partially inserted between fourth and fifth; five or six lower labials; mental little larger than rostral, followed by a large undivided postmental; this followed by three pairs of chin shields, first pair in contact, second pair widest; eye moderately large with a transparent disk on lower eyelid; disk sometimes opaque; auricular opening wanting, its position marked by a small depression covered with scales; sixteen to twenty-two lamellæ under fourth toe; limbs small, weak, touching when adpressed; preanals enlarged; twenty to twenty-two rows of smooth scales around body, the median dorsals much enlarged; ventral scales frequently irregular in size; scales not widened under tail, except when regenerated.

Color in life.—A bright golden brown above with four heavy black stripes from head to base of tail; the two median stripes begin on anterior part of supraocular region and continue practically the same width to base of tail, and they usually continue some distance on tail as dim dotted lines; the two lateral stripes begin on point of snout, continue through eye, and along side to above hind leg; belly yellow to pinkish brown; chin and throat more or less speckled with brown; tail usually pinkish brown above and flesh pink below; labials spotted brown; digits with brown crossbars.

Measurements of Siaphos infralineolatum (Günther).

| | mm. |
|-----------------------|------|
| Total length | 74 |
| Snout to vent | 34 |
| Snout to foreleg | 14 |
| Tail, tip regenerated | 40 |
| Axilla to groin | 17.5 |
| Foreleg | 8.5 |
| Hind leg | 11 |

Variation.—A few differences in coloration are discernible in the specimens at hand. Some specimens have a heavier wash of brown on the tail; the continuation of the median stripes on the tail is variable; sometimes even the dotted lines are absent, or dim. In certain specimens there is indication of a banded arrangement of the brownish coloration on the tail; in two specimens there are faint suggestions of longitudinal lines on the belly. Specimens from the Sulu Archipelago are usually darker, and the markings frequently appear as three yellow to golden brown stripes on the back; the sides of the neck, the chin, and sometimes the sides are dark, speckled with white. In scalation the chief variations are in scale rows and the number of lamellæ under the fourth toe; the length of the legs and the proportional length of the fourth and third toes vary. Only one specimen has twenty-two scale rows; the others have twenty. In each of them there is a distinct depression marking the position of the auricular opening. The longest is 90 millimeters long; snout to vent, 41 millimeters.

Remarks.—This species is commonly found under bark on dead trees and stumps, where it remains concealed, feeding on the larvæ of beetles and other insects which live in such localities. I have never observed it crawling in daylight unless routed from its natural habitat.

It is not rare at Bunawan, at Zamboanga, or in the Sulu Archipelago. I have failed to find specimens in any other local-

ities. This is the first record of this species * in the Islands. Known also from Celebes and Sanghir Islands, the latter being the type locality; the type was collected there by Dr. A. Meyer.

SIAPHOS AURICULATUM Taylor

PLATE 3, FIG. 2

Siaphos auriculatum TAYLOR, Philip. Journ. Sci. § D 12 (1917) 377, pl. 2, fig. 2.

Description of species.—(From the type, No. 894, E. H. Taylor collection; collected on Canlaon Volcano, Negros, December 23, 1915, elevation 900 meters, by E. H. Taylor.) Rostral large, covering the end of the conical snout, forming a broad suture with frontonasal, about equal to that with nasals; frontonasal very large, convex anteriorly and concave posteriorly, forming its largest suture with frontal; prefrontals absent; frontal rather triangular in shape, longer than broad, the anterior part rounding, not as wide as supraocular region; frontoparietals fused into a single large scale, which is distinctly wider than supraocular region, and in contact with three supraoculars; interparietal as wide as frontal, but shorter; parietals elongate, diagonal, more than twice as long as wide, joined behind interparietal, in contact anteriorly with two very small postoculars; three or four pairs of enlarged nuchals; nostril pierced in the middle of the single nasal, which is followed by two frenals subequal in size, as high as nasal; two superimposed preoculars; eight superciliaries, anterior largest; four supraoculars, two touching frontal, second widest; two pairs of slightly enlarged postoculars and a row of scales above upper

* Except for the disk present on the lower eyelid, this species might be united with *S. quadrivittatum*. The coloration and markings are nearly identical, and they vary in no other essential detail save the one mentioned. Peters states of his species, "Unteres Augenlid undurchsichtig und Trommelfell vollständig von dachziegelförmigen Schuppen versteckt." While he states that the eyelid is opaque, he neither mentions the presence of a disk, nor states that the eyelid is scaled. Boulenger's description (op. cit.) which appears to be taken from Peters's description (op. cit.) of type, states "Lower eyelid scaly." Whether or not he examined the type is not stated. I am strongly inclined to believe that the two forms, *infralineolatum* and *quadrivittatum* are identical. I shall, however, retain them as separate species until the types of the latter are examined on the point in question. The fact that the type locality of *S. quadrivittatum* is Mindanao, with specimens known from Celebes, makes the habitat of the two species identical. If the types of *S. quadrivittatum* have the lower lids scaled, it might prove a case of individual variation. Nelly de Rooij (op. cit.) retains the two separate, and also states that the lower eyelid is scaled.

labials; a rather enlarged scale between fourth and fifth upper labials; eight upper labials, fifth and sixth largest, below eye; two enlarged temporals, with three or four others not so large; auricular opening comparatively large, a little more than half the diameter of eye; tympanum distinct, not covered with scales, not deeply sunk; six or seven lower labials; mental rather large, followed by a large undivided postmental, which is followed by three pairs of chin shields, first pair in contact, second pair separated by a single scale, third pair separated by three scales and followed by one enlarged scale; scales in twenty-four rows around body, the two median dorsal rows greatly enlarged; two enlarged anals; fourth toe slightly longer than third; adpressed legs fail to meet; twenty lamellæ under fourth toe; lower eyelid with an undivided transparent disk.

Color in life.—Above grayish brown with a median stripe of dark brown, covering part of the two median scale rows, continuing as a dotted stripe on tail, dim on neck; a dark brown stripe begins behind eye and continues laterally to near end of tail; this does not involve ear and is about three scales wide on side; it grows dimmer on tail; head grayish brown with irregular darker markings; laterally quite dark with a lighter area on each labial; below rather dirty whitish; fingers and toes barred with blackish brown.

Measurements of Siaphos auriculatum Taylor.

| | mm |
|------------------|-----|
| Length | 97 |
| Snout to vent | 43 |
| Axilla to groin | 24 |
| Snout to foreleg | 17 |
| Foreleg | 8.5 |
| Hind leg | 14 |
| Width of head | 6 |
| Width of body | 7 |

Variation.—Two other specimens in my collection were obtained in the same locality. Each has twenty-two rows of scales around the body. In No. 893 the interparietal is partially fused with the parietal; the median stripe is very dim and the color is iridescent olive brown with a suggestion of a narrow greenish line just above the lateral brown stripe. In No. 895 the stripe appears as a double row of dots. It is the largest specimen and measures 47 millimeters from snout to vent.

Remarks.—This species has no close affinity. The absence of prefrontals, the size of the auricular opening, and the tympanum being free from scales are characteristics that clearly

differentiate it from other members of the genus. Three specimens were taken in the type locality. It is an arboreal species.

SIAPHOS QUADRIVITTATUM (Peters)

Lygosoma (Cophoscincus) quadrivittatum PETERS, Mon. Berl. Ak. (1867) 19; (1872) 583.

Lygosoma quadrivittatum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 329; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 271.

Description of species.—Snout short, pointed; lower eyelid scaly; ear hidden under scales; nostril pierced in a single nasal which is diagonally elongated; no supranasals; frontonasal in contact with rostral and frontal; prefrontals small and separated; frontal small, pointed behind, touching two supraoculars; frontoparietal single, large; interparietal distinct; parietals in contact behind latter; three pairs of nuchals; fourth and fifth upper labials below eye, fourth entering orbit, fifth separated from it by two scales; two equal-sized frenals; eight or nine superciliaries; four supraoculars; temporals enlarged; two enlarged preanals; eighteen to twenty smooth scales around body, the dorsals much enlarged; distance between end of snout and foreleg contained one and three-fifths times in axilla-to-groin distance; tail thick, a little shorter than head and body; limbs short, overlapping slightly when adpressed; digits slender, fourth toe longest, with fifteen to sixteen lamellæ below.

Color.—Yellowish above, with four black longitudinal bands, the median one reaching supraoculars, the laterals reaching eye; lips, chin, and sides of head and neck spotted with black; digits with black crossbars; tail dark spotted, the spots sometimes forming short vertical bars on each side. Lower parts yellowish white.

Measurements of the type of Siaphos quadrivittatum (Peters).

| | mm. |
|---------------|------|
| Total length | 80 |
| Head and body | 32.5 |
| Foreleg | 7.5 |
| Hind leg | 10 |

Remarks.—The types of this species were collected by Dr. C. Semper in Mindanao. It has since been reported from Borneo, Celebes, and Malacca. (Note remarks under *Siaphos infra-lineolatum*.)

Genus EMOIA Gray

Emoia GRAY, Cat. Liz. (1845) 95.

Emoa GIRARD, U. S. Explor. Exped., Herp. (1858) 262.

Lygosoma (sec. *Emoa*) BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 211.

Legs well developed, pentadactyl, overlapping when adpressed; lower eyelid with a transparent disk; tympanum distinct; supranasals present; rostral forming a suture with frontonasal; frontal not broader than supraocular region; preanals not or scarcely enlarged; digits with large number of lamellæ below.

Three species of *Emoia* are known from the Philippines.

Key to the Philippine species of Emoia Gray.

*a*¹. Interparietal distinct.

*b*¹. Lamellæ under fourth toe, 60 to 62; scales around body, 26; body with greenish yellow stripes; tail red.. *E. ruficauda* Taylor (p. 224).

*b*². Lamellæ under fourth toe, 35 to 38; scale rows about body, 30 to 40; body grayish mottled with black.. *E. atrocostatum* (Lesson) (p. 226).

*a*². Interparietal fused with frontoparietal. Lamellæ under fourth toe, 40 to 60; scales around body, 26 to 36; body with greenish yellow stripes; tail azure blue..... *E. cyanurum* (Lesson) (p. 228).

The two species listed last are terrestrial in habit and widely distributed. They are found near seacoasts, where they feed largely on small crabs and other marine crustaceans. *Emoia atrocostatum* is almost aquatic, and not infrequently will enter the sea water and dive. This species swims well and probably can thus go long distances. I have found specimens on floating logs a short distance from land. *Emoia ruficauda* is arboreal in habit, and feeds on small insects in trees and in the coarse, high, swamp grass. It is rarely seen on the ground.

EMOIA RUFICAUDA Taylor

PLATE 18, FIG. 2

Emoia ruficauda TAYLOR, Philip. Journ. Sci. § D 10 (1915) 98.

Description of species.—(Described from four cotype specimens in E. H. Taylor collection, from Bunawan, Agusan.) Head slightly distinct from neck; snout bluntly pointed; rostral forming a broad suture with frontonasal; latter broader than long, in contact with frontal; supranasals present, small, elongate, bordering nostril; prefrontals separated, large, barely in contact with first supraocular; frontal about as long as frontoparietal, not as wide as supraocular region, in contact with two supraoculars; frontoparietal single, larger than frontal; interparietal distinct, small; parietals forming a suture behind latter, bordered behind by a pair of nuchals and a pair of very much enlarged elongate temporals; nasal divided; nostril surrounded by three scales; two frenals, second largest and widest; three preoculars, the median largest; four much-enlarged temporals; four supraoculars; seven superciliaries; seven upper

labials, fifth largest and below eye; six lower labials; eye nearer ear than tip of snout, the lower eyelid with an undivided transparent disk; auricular opening oval, not as large as disk in eyelid, nearer foreleg than end of snout; auricular lobules very small, if present; legs well developed; the adpressed hind leg about reaches elbow; digits depressed proximally, with extremely numerous, narrow lamellæ below; distal portion compressed with broad scalelike lamellæ, fifty-eight to sixty-two under fourth toe.

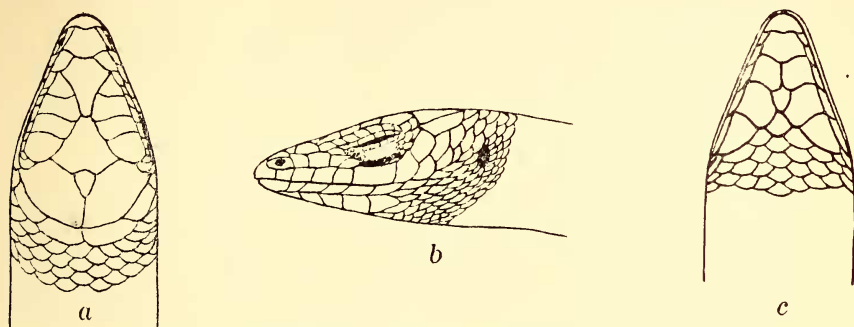


FIG. 38. *Emoia ruficauda* Taylor, from the type; a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

Color in life.—Above black with five golden yellow lines on the back; the median line begins on tip of snout and continues to base of tail; the dorsolateral lines begin on first supraocular and are lost in the reddish color of tail; the two broad dark stripes on back, bordered laterally by the yellow stripes, join behind the end of the median yellow stripe and continue as a narrow dark line some distance on tail; lateral yellow lines begin on upper labials and continue to groin; below bluish white; light above on limbs; tail bright red; colors of young and adult are the same, save that the golden yellow stripes in the young are sometimes greenish instead of golden yellow. In alcohol the ground color becomes brown with a black spot on each scale, the tail yellow, and the yellow lines bluish.

Measurements of Emoia ruficauda Taylor.

| | mm. |
|------------------|-----|
| Total length | 129 |
| Snout to vent | 50 |
| Tail | 79 |
| Snout to foreleg | 78 |
| Axilla to groin | 27 |
| Foreleg | 15 |
| Hind leg | 22 |

Variation.—In the specimens examined very little variation was evident save in the number of lamellæ under the toes.

Remarks.—I found this species abundant along the upper Agusan River and in the sunken lake region of central eastern Mindanao. It was conspicuous by its brilliant colors in the tall grass (*tigbao*) that bordered the lakes and streams, but in this habitat it was almost impossible to capture it. From the other Philippine species of *Emoia* it is easily distinguished by the color of the tail, the presence of the small interparietal, and the large number of subdigital lamellæ.

EMOIA ATROCOSTATUM (Lesson)

Scincus atrocostatus LESSON, Voy. Coquille, Zool. 2 (1830) 50, pl. 4, fig. 3.

Mocóa cumingii GRAY, Cat. Liz. (1845) 81.

Mabuia atrocostatus GRAY, Cat. Liz. (1845) 95.

Eumeces freycinetii DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 648.

Euprepes bitæniatus PETERS, Mon. Berl. Ak. (1864) 53.

Euprepes (Mabuya) cumingii PETERS, Mon. Berl. Ak. (1867) 20.

Euprepes (Mabuia) microstictus PETERS, Mon. Berl. Ak. (1874) 373.

Euprepes (Mabuya) atrocostatus PETERS and DORIA, Ann. Mus. Genova 13 (1878) 358.

Mabuia erdoniana STOLICZKA, Journ. As. Soc. Bengal (1870) 172.

Eumeces serratus FISCHER, Abh. Natur. Ver. Hamburg 9 (1886) pl. 2, fig. 3.

Lygosoma cerdonianum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 300.

Eumeces singaporensis STEINDACHNER, Sitzb. Ak. Wien I 62 (1870) 341, pl. 4, fig. 2.

Lygosoma atrocostatum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 295; Rept. and Batr. Mal. Pen. (1912) 94, 95; ANNANDALE, Journ. As. Soc. Bengal I 2 (1905) 147; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 259.

Emoia atrocostatum BARBOUR, Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 94.

Description of species.—(From No. 880, Bureau of Science collection; collected at Bantayan, Cebu, by L. E. Griffin.) Snout long and obtusely pointed; portion of rostral visible above about equal to its height; small, elongate supranasals present, widely separated, bordering nostril; frontonasal broader than long, forming a broad suture with rostral, barely in contact with frontal; prefrontals large, narrowly separated; frontal small, truncate behind, about equal in length to the single frontoparietal, but slightly smaller; four supraoculars, second largest; frontal in contact with two supraoculars; interparietal very small; parietals forming a suture behind latter; a pair of nuchals bordered by slightly enlarged body scales; nasal divided, the nostril surrounded by three scales; two frenals, second much

wider than deep, nearly twice the size of first; eight upper labials (seven on left side), sixth largest and normally below eye; three preoculars, the lowest much the largest; seven superciliaries; five enlarged temporals, largest bordering parietal; five or six lower labials; lower eyelid with a disk, frequently opaque; ear-opening small, with small anterior lobules, nearer arm than end

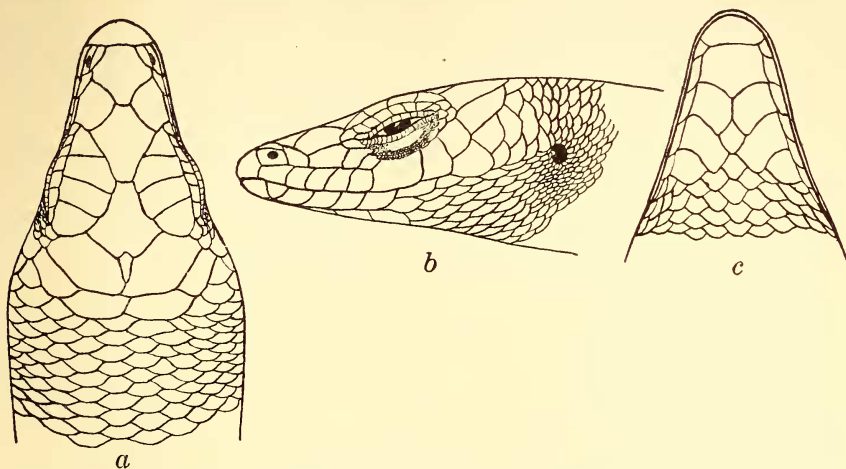


FIG. 39. *Emoia atrocostatum* (Lesson); a, head, dorsal view; b, head, lateral view; c, chin; $\times 2$.

of snout; preanals elongate, slightly enlarged; median row of scales under tail widened; legs strong, well developed, the hind leg reaching beyond elbow when adpressed; thirty-eight lamellæ under fourth toe; toes depressed and slightly compressed distally; forty scale rows about body; scales smooth with no evidence of keels, dorsals largest.

Color in life.—Above a uniform grayish olive, with darker and lighter indistinct spots; sides somewhat darker; belly greenish to dirty yellowish white.

Measurements of Emoia atrocostatum (Lesson).

| | mm. |
|------------------|-------|
| Total length | 195.5 |
| Snout to vent | 81.5 |
| Snout to foreleg | 32 |
| Tail | 114 |
| Axilla to groin | 40 |
| Foreleg | 25 |
| Hind leg | 37 |

Variation.—The amount of variation is small among the eight specimens in the Bureau of Science collection. The lamellæ under the fourth toe vary between thirty-seven and forty-two;

the number of scale rows is forty; the frontonasal and frontal are usually separated. In a series of nine specimens * in my collection I find the frontal broadly in contact with the frontonasal in all except one specimen, in which it barely touches; the toes are more depressed; the scales are in forty rows, the lamellæ vary between thirty-five and thirty-eight. Nearly all the scales on the head and the body are dimly edged with black. According to de Rooij the scale rows vary between thirty and forty. The Mindoro specimens also differ from the Bantayan specimens in having the median instead of the lower preocular largest.

Remarks.—Found throughout the Malay Archipelago and northern Australia, Caroline Islands, etc. In the Philippines it is known from Dinagat, Bantayan, Mindoro, Zamboanga, and most of the islands of the Sulu Archipelago. Stejneger reports a specimen from Bubuyan Islands, north of Luzon, collected by Mr. R. C. McGregor. It is usually found along sandy beaches and mangrove swamps. I have never encountered it more than a few meters from the shore. It burrows in the sand, and feeds almost wholly on small shore crabs. The female deposits two eggs in a burrow near the surface of the sand. This species is much larger than the other Philippine species of the genus.

EMOIA CYANURUM (Lesson)

PLATE 15, FIG. 4

Scincus cyanurus LESSON, Voy. Coquille, Zool. 2¹ (1830) 49, pl. 4, fig. 2.

Tiliqua cyanura GRAY, Ann. & Mag. Nat. Hist. 2 (1838) 289.

Eumeces lessonii DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 654.

Mabouya cyanura GRAY, Cat. Liz. (1845) 96.

Emoa cyanura GIRARD, U. S. Explor. Exped., Herp. (1858) 270.

Euprepes cyanurus STEINDACHNER, Novara Rept. (1869) 44.

Mabouia baudinii (non Duméril and Bibron) GÜNTHER, Proc. Zool. Soc. London (1874) 296.

Euprepes (Mabuya) kordoanus MEYER, Mon. Berl. Ak. (1874) 133; PETERS and DORIA, Ann. Mus. Genova 13 (1878) 357.

Euprepes (Mabuya) beccarii DORIA, Ann. Mus. Genova 6 (1874) 338, pl. 11, fig. D.

Euprepes (Mabuya) cyanurus DORIA, Ann. Mus. Genova 6 (1874) 338; PETERS and DORIA, Ann. Mus. Genova 6 (1874) 356.

Lygosoma cyanurum BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 290; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 253, fig. 90.

Emoia cyanurum BARBOUR, Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 93.

Description of species.—(No. 1344, Bureau of Science collection; collected on Comiran Island, near Balabac, by W. Schultze.)

* From Mindoro.

Head rather distinct from neck, snout pointed, somewhat depressed; rostral comparatively small; supranasals present, narrow, elongate, bordering nostril above (one on right side broken); frontonasal broader than long, forming equal sutures with frontal and rostral; prefrontals rather small, widely separated; frontal much longer than its distance to end of snout, not wider than supraocular region, longer than, or as long as, the large frontoparietal, in contact with two supraoculars; frontoparietal single, fused with interparietal into a single large shield; parietals small, forming a suture, bordered by a pair of nuchals and a pair of temporals; nasal divided into an anterior and a posterior part which, with the supranasal, surround nostril; two frenals, first high and narrow, second low, broad, and very much larger than first; four supraoculars, first two bordering the frontal,

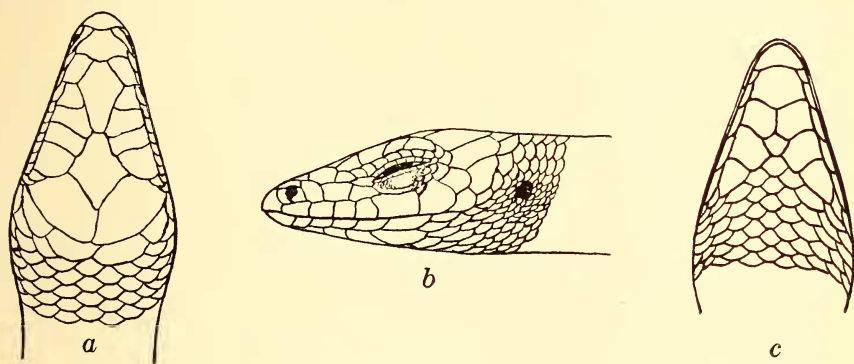


FIG. 40. *Emoia cyanurum* (Lesson); a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

last three the frontoparietal, second much the largest; eight superciliaries; three preoculars; eight upper labials (seven on left side), sixth much broadened, bordering orbit below; four enlarged temporals; five or six lower labials; thirty scale rows around body, smooth or very dimly keeled laterally; ventrals a little larger than dorsals; preanals only slightly enlarged; ear opening fairly large, about the size of disk in eyelid, with small lobules anteriorly; eye moderate, equidistant from ear and end of snout; ear much nearer foreleg than end of snout; legs stout, the hind limb reaching axilla when adpressed; fourth toe very long, with forty lamellæ below.

Color in life.—Above almost a uniform gray-olive, below lighter. Younger specimens are dark olive brown with three yellow stripes down back; tail bright bluish; chin, throat, and belly dirty yellowish white; lamellæ dark.

Measurements of Emoia cyanurum (Lesson).

| | mm. |
|------------------|------|
| Total length | 140 |
| Tail | 90 |
| Snout to vent | 50 |
| Snout to foreleg | 22.5 |
| Axilla to groin | 23 |
| Foreleg | 18 |
| Hind leg | 24 |

Variation.—This widely distributed species is very variable.* The length of the hind leg varies in its reach between the elbow and the shoulder; the number of scale rows varies between twenty-six and thirty-six, and of the lamellæ under the fourth toe, between forty and sixty. Adult specimens lose the stripes and become plain brown, even on the tail. None of the specimens shows more than three golden to greenish lines on the back.

Remarks.—Mr. Schultze, the collector of the specimen, assures me that the species is unbelievably numerous on the low island of Comiran, and that it is the only lizard there, exclusive of geckos. It very probably occurs on other islands of the Palawan-Balabac groups. In the Sulu Archipelago I found it on a single small island, known as Tulian Rock, situated directly west from Jolo at a distance of about a kilometer. The island is about 200 meters long and less than 100 meters wide with an elevation of about 20 meters. Three specimens were captured, while many seen escaped. The brilliant blue tail of this species makes it conspicuous and if it were common in the Archipelago its presence would surely have been observed on others of the numerous islands visited.

Girard's Philippine specimens were probably from somewhere in the Balabac Straits, whether on Philippine territory or not I am not certain. He states, "the same species was also met with at the Sandwich Islands, and the Philippine Archipelago." This is the first and I believe the only Philippine record prior to the specimens recorded by myself from Tulian Rock and Comiran.

The species is widely distributed in the Moluccas, Papuasia, Polynesia, Java, Borneo, Celebes, and Sanghir Islands.

Genus *RIOPA* Gray

Riopa GRAY, Ann. & Mag. Nat. Hist. 2 (1839) 332; Cat. Liz. (1845) 96.

* Philippine specimens vary but little from the one described.

Legs usually short or rudimentary; lower eyelid scaly or with an undivided transparent disk; ear opening present; supranasals present; prefrontals well developed; frontal not broader than supraocular region.

This genus contains about twenty-four species, distributed from India to New Guinea and Africa. Only a single species has been found in the Philippines; this is the widely distributed *Riopa bowringii* (Günther). The only Philippine localities are five islands in the southern part of Sulu Archipelago. The species is a diminutive skink, usually found under logs or leaves. It is probably fairly common in Sulu. All specimens seen by myself were captured.

RIOPA BOWRINGII (Günther)

Eumeces bowringii GÜNTHER, Rept. Brit. India (1864) 91.

Euprepes (Riopa) punctatostriatus PETERS, Mon. Berl. Ak. (1871) 31.

Lygosoma bowringii BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 308, pl. 23, fig. 3; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 264.

Lygosoma whiteheadi MOCQUARD, Le Nat. 12 (1890) 144; Nouv. Arch. Mus. III 2 (1890) 134, pl. 8, fig. 3.

Riopa bowringi TAYLOR, Philip. Journ. Sci. § D 13 (1918) 251.

Description of species.—(From No. 1990, E. H. Taylor collection; collected at Siet Lake, Jolo, September 22, 1917, by E. H. Taylor.) Snout rather obtuse, rostral slightly visible above; supranasals present, in contact behind rostral; frontonasal much broader than long, broadly in contact with frontal; prefrontals present, very small, very widely separated, leaving frontal in contact broadly with frontonasal; frontal longer than broad, as long as interparietal and frontoparietal; parietals in contact behind latter; a pair of nuchals and a large temporal border parietals; nostril pierced in a rectangular nasal, followed by two frenals, anterior higher than nasal and posterior frenal; two preoculars between first superciliary and fourth labial; seven superciliaries; four supraoculars, first broadly in contact with prefrontal; lower eyelid scaly; seven upper labials, fifth large, below eye, fourth as small as first; three or four enlarged temporals; six lower labials; mental rather wide, followed by a wide postmental; three pairs of divided chin shields, first only in contact, third small; ear opening small, with two projecting lobules; twenty-six rows of

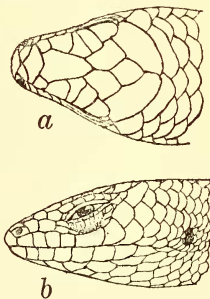


FIG. 41. *Riopa bowringii* (Günther), from Jolo; a, head, dorsal view; b, head, lateral view; $\times 3$.

scales about middle of body, all smooth; preanal scales somewhat enlarged; scales on underside of tail slightly larger than those above; limbs rather small; fourth toe only a little longer than third, thirteen lamellæ under fourth toe; tail thick, tapering very gradually; eye nearer end of snout than ear; latter nearer insertion of foreleg than end of snout; adpressed limbs fail to meet by a considerable distance.

Color in life.—Above yellowish to dark brown, the scales on each dorsal row with black spots, forming more or less regular longitudinal dark lines; a broad black line begins behind eye and continues above limbs to some distance on tail; scale row above the black line lighter than ground color; below the black line, other indistinct lines of brown with numerous distinct yellow punctations and occasional scales of reddish brown; below orange to pink; rather pinkish in groin; a distinct white line along upper labials.

Measurements of Riopa bowringii (Günther).

| | mm. |
|---|------|
| Total length, extreme tip of tail regenerated | 84.5 |
| Snout to vent | 42 |
| Snout to foreleg | 15 |
| Axilla to groin | 25 |
| Tail | 41.5 |
| Width of head | 5.1 |
| Length of head | 7.2 |
| Foreleg | 10 |
| Hind leg | 12.7 |

Variation.—Five other specimens from the Sulu Archipelago are in the collection. They agree with the above description with a few exceptions; one specimen has two pairs of nuchals, another has the frontoparietals fused. All save the one described have twenty-eight scale rows. A younger specimen in the collection is olive brown above. None shows evidence of carinations on the scales.

Remarks.—These specimens of *Riopa bowringii* (Günther) are the first recorded from the Philippines. The occurrence of this species is hardly a matter for surprise, since de Rooij has identified Mocquard's *Lygosoma whiteheadi* from North Borneo as a synonym.

The specimens obtained in the Sulu Archipelago are from the following islands: Siet Lake, Jolo, two specimens; Lapac, one specimen; Bongao, one specimen; Simonor, one specimen; Tawitawi, one specimen. Also known from several localities in

Borneo, and from Java, Celebes, Malacca, Siam, Burma, and Hongkong. The type locality is Hongkong, the type having been collected by Sir J. Bowring.

Genus LYGOSOMA Gray

Lygosoma GRAY, Zool. Journ. 3 (1828) 228; Cat. Liz. (1845) 85.

Elania GRAY, Cat. Liz. (1845) 80.

Lygosoma sec. *Lygosoma* BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 224.

Legs short or rudimentary; no supranasals present; prefrontals small and widely separated; frontal broader than supraocular region; lower eyelid scaly; ear opening small or wanting.

Only a single species of this genus has been discovered in Philippine territory. This is *Lygosoma chalcides* (Linnæus). It is also known in Sumatra and Java, and on the southeastern part of the Asiatic Continent. It appears that it has not as yet been reported from Borneo.

LYGOSOMA CHALCIDES (Linnæus)

Lacerta chalcides LINNÆUS, Syst. Nat. 1 (1766) 369.

Anguis quadrupes LINNÆUS, Syst. Nat. 1 (1776) 390.

Lacerta serpens BLOCH, Beschäft. Ges. Naturf. Freunde 2 (1776) 28, pl. 2.

Scincus brachypus SCHNEIDER, Hist. Amph. 2 (1801) 192.

Lygosoma serpens GRAY, Zool. Journ. 3 (1828) 228.

Lygosoma aureta GRAY, Grif. A. K. IX Syn. 72.

Lygosoma abdominalis GRAY, Ann. Nat. Hist. 2 (1839) 332.

Lygosoma brachypoda DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 721.

Lygosoma chalcides CANTOR, Cat. Mal. Rept. (1847) 49; BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 340; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 225; BARBOUR, Mem. Mus. Comp. Zool. Harvard Coll. 44 (1912) 95.

Lygosoma (*Lygosoma*) *chalcides* BOETTGER, Abh. u. Ber. König Zool. u. Anth. Ethnog. Mus. Dresden 7 (1894–1895) 1.

Eumeces chalcides GÜNTHER, Rept. Brit. India (1864) 90.

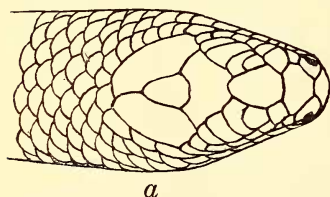
Description of species.—(From Boulenger.) “Body much elongate, limbs very weak; the distance between the end of the snout and the fore limb is contained four or five times in the distance between axilla and groin. Snout short, obtuse. Lower eyelid scaly. Nostril pierced in the centre of the nasal; no supranasal; frontonasal broader than long, forming a suture with the rostral and with the frontal; latter shield small, a little broader than the supraocular region, in contact with the first and second supraoculars; four supraoculars; seven supraciliaries; frontoparietal single, large; interparietal distinct;

parietals forming a suture behind the interparietal; first upper labial larger, fifth below the centre of the eye. Ear-opening punctiform, about as large as the nostril. 24 or 26 smooth scales round the middle of the body. Præanals not or very slightly enlarged. The fore limb, stretched forwards, reaches about half-way from the ear; the hind limb equals about the length of the shielded part of the head. Digits extremely short, subequal. Tail thick, as long as, or a little shorter than, head and body. Pale brown above, with more or less distinct darker longitudinal lines running between the series of scales; lower surfaces yellowish, uniform or with brown longitudinal lines."

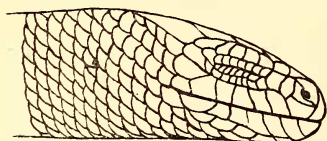
Measurements of Lygosoma chalcides (Linnaeus).

| | mm. |
|---------------|-----|
| Total length | 192 |
| Head length | 10 |
| Width of head | 6 |
| Body | 86 |
| Foreleg | 5 |
| Hind leg | 8 |
| Tail | 96 |

It is distributed throughout Java, Malay Peninsula, Siam, and southern China. In the Philippines it is known only from Palawan and Calamian Islands.



a



b

FIG. 42. *Lygosoma chalcides* (Linnaeus); after de Rooij; a, head, dorsal view; b, head lateral view; much enlarged.

Remarks.—Four specimens were taken on Busuanga Island and sent to the Dresden Museum by Dr. A. Schadenberg. I believe the first recorded specimen for the Philippines is that of Gogorza y Gonzales.

I collected several of these diminutive skinks on Busuanga and one specimen in Palawan during April, 1918. They feed largely on the larvæ and adults of white ants and can usually be found about rotting logs where there are ants. The young have numerous stripes on the back.

Genus TROPIDOPHORUS Duméril and Bibron

Tropidophorus DUMÉRIL and BIBRON, *Erp. Gén.* 5 (1839) 554; GRAY, *Cat. Liz.* (1845) 101; GÜNTHER, *Rept. Brit. India* (1864) 76; BOULENGER, *Cat. Liz. Brit. Mus.* 3 (1887) 359; *Fauna Brit. India*, *Rept.* (1890) 217; DE ROOIJ, *Rept. Indo-Aust. Arch.* 1 (1915) 275.

Leposoma (non Spix) CUVIER, Reg. Anim. ed. 2 2: 38.

Norbea GRAY, Cat. Liz. (1845) 101.

Aspris BLYTH, Journ. As. Soc. Bengal 22 (1853) 650.

Amphixestus PETERS, Mon. Berl. Ak. (1871) 573.

Enoplosaurus SAUVAGE, Bull. Soc. Philom. VII 3 (1879) 211.

"Palatine and pterygoid bones in contact on the middle line of the palate, which is toothless. Teeth conical. Eyelids well developed, scaly. Tympanum distinct, superficial. Nostril pierced in a single nasal; no supranasals; præfrontals well developed; frontoparietal present, single or double; interparietal distinct. Limbs well developed, pentadactyle; digits cylindrical, with transverse lamellæ inferiorly." (From Boulenger.)

The species of this genus are semiaquatic and for the most part are found along fresh-water streams in the low mountains. When disturbed they readily take to the water and are able to remain some time beneath the surface. They feed largely on small insects and frequently on fresh-water crustaceans. The young are born alive. Five species are known from the Philippines. The genus is distributed from southeastern China to Australia. Absent from Malay Peninsula.

Key to the Philippine species of Tropidophorus Duméril and Bibron.

*a*¹. A single frontoparietal plate; scales smooth; a pair of enlarged preanals.
T. leucospilos (Peters) (p. 235).

*a*². Frontoparietal double.

*b*¹ Three enlarged præanals; dorsal and lateral scales strongly keeled; subdigital lamellæ keeled; head shields rugose; an azygos shield between the frontonasals and the prefrontals.

T. grayi Günther (p. 236).

*b*². Single enlarged preanal.

*c*¹. Head shields smooth; dorsal and lateral body scales strongly keeled; tail with vertical spines..... *T. partelloi* Stejneger (p. 238).

*c*². Head shields feebly rugose; numerous small scales above anterior upper labials..... *T. rivularis* Taylor (p. 240).

*c*³. Head shields smooth; no small scales above anterior upper labials.
T. misaminius Stejneger (p. 242).

TROPIDOPHORUS LEUCOSPILOS (Peters)

Lygosoma (*Hinulia*) *leucospilos* PETERS, Mon. Berl. Ak. (1872) 684.

Tropidophorus leucospilos BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 360.

Description of species.—Head moderately long; snout not longer than diameter of eye; head scales perfectly smooth; rostral large; frontonasal broader than long, in contact with rostral, nasal, and anterior frenal; prefrontals broadly in contact; frontal rhomboidal, the anterior part short, the hinder part drawn out to a long, sharp angle, a little longer than frontoparietal; latter single, rather heart-shaped; interparietal of

nearly the same shape as frontal, but only half as large; parietals forming a suture behind it; nasal irregularly rhomboidal, pierced with a round nostril; four supraoculars, first longest; eleven superciliaries; seven upper labials, fourth to sixth, or fifth and sixth, below orbit, from which they are separated by a series of scales; five lower labials; mental large, with an undivided postmental, and three pairs of chin shields; tympanum smaller than eye opening, superficially placed; body surrounded by thirty rows of smooth scales, dorsals largest, laterals smallest; a pair of enlarged preanals; foreleg brought forward reaches halfway between eye and ear; third and fourth fingers equally long; hind leg reaches wrist; subdigital lamellæ smooth; tail compressed; a little longer than head and body.

Color.—Brown above, variegated with darker, and with bluish white spots arranged in longitudinal and transverse series; base of arm, axilla, and lower surfaces reddish flesh color.

*Measurements of Tropidophorus leucospilos (Peters).**

| | mm. |
|---------------|-----|
| Total length | 118 |
| Head | 12 |
| Width of head | 8 |
| Body | 43 |
| Foreleg | 15 |
| Hind leg | 21 |
| Tail | 63 |

Remarks.—This species is apparently rare. The type is from Luzon (locality not stated), collected by Meyer, and I believe no specimen has been found elsewhere. It is a clearly defined species and differs from other Philippine species of the genus by the smooth head scales and the absence of keels on the body.

TROPIDOPHORUS GRAYI Günther

PLATE 21, FIG. 1

Tropidophorus grayi GÜNTHER, Proc. Zool. Soc. London (1861) 189.

Tropidophorus cocincinensis (non Duméril and Bibron) GRAY, Cat. Liz. (1845) 101.

Enoplosaurus insignis SAUVAGE, Bull. Soc. Philom. VII 3 (1879) 211.

Tropidophorus grayi BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 364; DE ROOIJ, Rept. Indo-Aust. Arch. 1 (1915) 279.

Description of species.—(From No. 661, E. H. Taylor collection; collected on Mount Mariveles, Bataan, 1914, by E. H. Taylor.) Head broadened in temporal region, distinct from neck, upper head scales very rugose, and strongly striated; rostral narrowly visible from above, twice as broad as high; fronto-

* From Boulenger's Catalogue.

nasal divided, each part nearly twice as long as wide; prefrontals large, separated by a small azygos interfrontal scale which forms a narrow suture with frontal; frontal twice as long as wide, but little wider in front than behind, longer than its distance from snout; four supraoculars, anterior narrow and long, first two in contact with frontal; frontoparietal divided, each part smaller than interparietal, which is broken behind; parietals separated, as broad as long, bordered behind by a pair of nuchal scales, which are widely separated by several small scales; nasal at least partially divided; two large irregular frenals, the posterior in contact with anterior superciliary; two preoculars, lower large, and two smaller, keeled scales above fourth labial; eight superciliaries, first two large, strongly keeled; these keels, together with the keels on prefrontals and frontoparietals, form a rather distinct canthus rostralis; three small scales below anterior superciliaries; temporals moderate, the largest bordering parietal, none as large as scales on neck or body; eight upper labials, fifth largest, directly below eye; five lower labials; mental small, followed by a large single postmental; latter followed by two pairs of chin shields, first pair in contact, second pair (of which the scale on left side is fused with the preceding scale) separated by a few minute scales; a third pair, largest, rather widely separated; tympanum superficial, about as large as eye opening; twenty-six rows of scales about middle of body, the lateral scales forming diagonal series; on back, six rows of much-enlarged scales with heavy spiny keels; a median row beginning behind arms continues some distance on base of tail, the scales of which are smaller than the other dorsal scales; scales on hind legs very much more strongly keeled than those on forelegs; lateral scales and scales on neck and throat keeled, the six abdominal rows smooth; scales on underside of tail small, smooth, slightly striate; scales on upper side of tail with very spiny keels; legs strong; adpressed hind leg reaches to near elbow of adpressed foreleg; digits and palms with unicarinate lamellæ below, about sixteen under fourth toe; three enlarged preanals; tail compressed, with lateral longitudinal depressions.

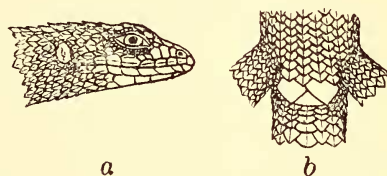


FIG. 43. *Tropidophorus grayi* Günther; after Boulenger; a, head, lateral view; b, anal region.

scales on neck or body; eight upper labials, fifth largest, directly below eye; five lower labials; mental small, followed by a large single postmental; latter followed by two pairs of chin shields, first pair in contact, second pair (of which the scale on left side is fused with the preceding scale) separated by a few minute scales; a third pair, largest, rather widely separated; tympanum superficial, about as large as eye opening; twenty-six rows of scales about middle of body, the lateral scales forming diagonal series; on back, six rows of much-enlarged scales with heavy spiny keels; a median row beginning behind arms continues some distance on base of tail, the scales of which are smaller than the other dorsal scales; scales on hind legs very much more strongly keeled than those on forelegs; lateral scales and scales on neck and throat keeled, the six abdominal rows smooth; scales on underside of tail small, smooth, slightly striate; scales on upper side of tail with very spiny keels; legs strong; adpressed hind leg reaches to near elbow of adpressed foreleg; digits and palms with unicarinate lamellæ below, about sixteen under fourth toe; three enlarged preanals; tail compressed, with lateral longitudinal depressions.

Color in life.—Brown above with indications of lighter and darker transverse bands, most distinct on tail; throat brown; belly yellowish white; tail rather indistinctly barred below.

Measurements of Tropidophorus grayi Günther.

| | mm. |
|-----------------------|-----|
| Total length | 213 |
| Snout to vent | 109 |
| Tail, tip regenerated | 104 |
| Snout to arm | 44 |
| Axilla to groin | 46 |
| Foreleg | 26 |
| Hind leg | 41 |

Variation.—I have at hand six specimens from Mount Mari-veles, Bataan, and fourteen from Isabela, Occidental Negros. The scale rows vary between twenty-six and twenty-eight, (twenty-four to twenty-eight, according to Boulenger). The tail is a little longer than head and body when intact. Younger specimens have the belly scales keeled rather strongly.

Remarks.—I have found this species common in the two localities mentioned, but have failed to find it elsewhere. The type was collected by H. Cuming, the exact type locality not known. These lizards live along small mountain streams, and are usually found under partly submerged rocks or logs; they readily dive under water when disturbed and take refuge under completely submerged objects. Their extremely spiny appearance makes them easily recognizable.

The species is also reported from Celebes by de Rooij.

TROPIDOPHORUS PARTELLOI Stejneger

Tropidophorus partelloi STEJNEGER, Proc. U. S. Nat. Mus. 39 (1911) 97.

Description of type.—(From Stejneger.) “Upper head shields smooth; fronto-nasal broader than long; prefrontals broadly in contact; frontal as long as fronto-parietals and interparietal together, in contact with two anterior supraoculars; five supraoculars, first longest, fifth smallest, second in contact with fronto-parietal; two anterior supraciliaries larger, followed by five very small ones, none behind the suture between third and fourth supraocular; fronto-parietals separate, shorter than interparietal; parietals not in contact behind interparietal; nostril a round hole in the middle of a single nasal, which is followed by two loreals one behind the other; behind the orbit three vertical rows of small scales followed by two rows of large temporal shields; between these and the unprotected ear-opening several rows of scales keeled vertically; seven supralabials, the anterior four low and slightly increasing in size backward, the fifth suddenly much higher, but not much wider, sixth and seventh nearly as large; fifth supralabial under the center of the eye, sixth just touching the orbit anteriorly, and both separated from the orbital

scales by a single row of small scales, smaller than the posterior supraciliaries; four lower labials, first very small, second and third excessively elongate, together nearly as long as five supralabials; a large unpaired postmental followed by three pairs of large submandibulars, the two anterior pairs of which are in contact on the middle line; ear-opening oval, slightly smaller than eye-opening; 32 scales around the middle of the body; nine dorsals in the shielded part of the head; dorsals and laterals strongly keeled and on the posterior half of the body strongly mucronate, the keels of the dorsals forming six straight lines on the back, the laterals forming numerous oblique lines converging toward the sacrum; ventrals smooth, much smaller than dorsals, about fifteen in a head length; a single very large preanal plate; legs covered above with strongly keeled and mucronate scales; third finger nearly as long as fourth; subdigital lamellæ smooth, 24 under the fourth toe; extended hind leg reaches beyond the elbow; tail slightly compressed with six series of very strong mucronate keels at base, this arrangement soon giving way to a mass of high, nearly vertical spines, each one occupying the whole scale, and all nearly the same size, there being no pronounced serial nor verticillate arrangement; tail underneath with a series of smooth, wide plates, on each side with a single series of mucronate scales; length of tail not one and one-half the length of the body."

Color in alcohol.—"Above vandyke-brown more sooty on the sides, with about eight irregular and more or less interrupted, narrow, pale cross bars; tail with indications of similar pale cross bars; fingers and toes with distinct cross bars of dark and pale brown of about equal width; head above and on sides uniform glossy brown; throat and lower neck more grayish brown, a narrow pale line crossing the commissure from the third supralabial and another from the fifth across the submandibulars to the throat; underside of abdomen, legs, and basal portion of tail pale, the terminal two-thirds dark brown like the upper side; scale-row nearest subcaudals pale, forming a pale line on more than basal half of tail."

Measurements of Tropidophorus partelloi Stejneger:

| | mm. |
|---------------------------------------|-----|
| Total length, tip of tail regenerated | 212 |
| Snout to vent | 105 |
| Snout to ear opening | 25 |
| Width of head | 19 |
| Vent to tip of tail | 107 |
| Foreleg | 34 |
| Hind leg | 46 |

Remarks.—This species, of which no specimen is at hand, may be readily distinguished by the spines on the tail which reach a length of 2 to 2.5 mm. The type, an adult male, was collected at the Mataling River Falls, 430 meters altitude, Cotabato, Mindanao, on December 12, 1908, by Maj. J. M. T. Partello.

TROPIDOPHORUS RIVULARIS Taylor

PLATE 21, FIG. 2

Tropidophorus rivularis TAYLOR, Philip. Journ. Sci. § D 10 (1915) 106.

Description of species.—(From the type, No. 1780, Bureau of Science collection; collected by E. H. Taylor.) Head scales feebly rugose with grooves between shields; rostral broader than high, concave above; frontonasal as long as broad, or slightly broader than long; prefrontals broadly in contact, touching both frenals and first superciliary; frontal elongate, equal to or slightly narrower than supraocular region, longer than its distance to end of snout, equal to length of frontoparietals and interparietals together, in contact with three anterior supraoculars; first supraocular much longer than wide; fifth and last small; frontoparietals distinct; interparietal small, followed by a narrow, elongate scale completely separating the parietals their entire length; nostril in single nasal (in some specimens nasal partially broken); two frenals, latter large, separated from labials, the back part depressed in a very distinct groove running diagonally in front of eye; ten superciliaries, first two very large, last two

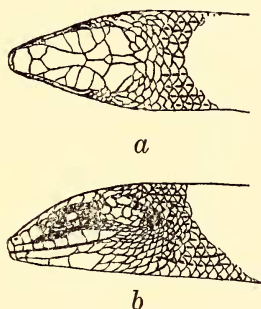


FIG. 44. *Tropidophorus rivularis* Taylor; a, head, dorsal view; b, head, lateral view; $\times 1$.

behind fourth supraocular which borders orbit; temporals not much enlarged, those bordering parietal elongate, largest being midway between eye and auricular opening; eight upper labials, sixth and seventh largest, below eye; a deep groove above labials and a series of five or six small scales inserted, separating second frenal from labials; mental small, followed by a large, unpaired postmental and three pairs of chin shields, first two in contact; four lower labials, second much elongate; thirty to thirty-two rows of scales around middle of body; scales on neck and sides of body and tail keeled; keels on back forming a longitudinal line, those on sides diagonal lines; scales on underside of neck, legs, and tail smooth; scales on back little larger than

those on belly; scales under tail broadened; a single, large pre-anal; limbs strong, fourth toe with twenty smooth lamellæ below; auricular opening a little more than half eye.

Color in life.—Body above reddish brown, barred across back with a series of indistinct irregular crossbands, not or scarcely visible on sides; sides darker, with bright yellow spots, seldom more than two or three scales in size; lateral scales flecked with small yellow or orange spots; head lighter brown without markings above; lips and underside of throat and chin grayish blue; abdomen and underside of limbs yellowish white; basal third of tail rather pinkish.

Measurements of Tropidophorus rivularis Taylor.

| | mm. |
|--------------------|-------|
| Total length | 197 |
| Snout to vent | 91.5 |
| Tail (regenerated) | 105.5 |
| Snout to foreleg | 35 |
| Axilla to groin | 45 |
| Foreleg | 26 |
| Hind leg | 39 |

Variation.—The several specimens from the type locality agree fairly well in scalation. One specimen shows the two interparietals fused into one. Several specimens taken near Zamboanga differ from typical specimens in having the head shields almost smooth and the two interparietals fused. This character of the type is probably variable. A younger specimen with the tail intact measures as follows: Total length, 160 millimeters; snout to vent, 59; tail, 101. The largest taken measures 101 millimeters from snout to vent.

Remarks.—This species and *T. misaminius* Stejneger are closely related to *Tropidophorus brooki* Gray, of Borneo. Stejneger has pointed out the differences between *T. misaminius* and *T. brooki*.*

The present species differs from both by the presence of a series of small scales above the upper labial scales, and the strong, deep, diagonal groove in front of the eye. The species is common in the small mountain streams of the upper Agusan Valley. These skinks live for the most part under partly submerged rocks and logs, or in small holes in the banks of streams. They are even more aquatic than *T. grayi* and invariably take to water when disturbed. I have found the species only at Bunawan, Agusan, Mindanao, and at Zamboanga.

* Proc. U. S. Nat. Mus. 34 (1908) 203, 204.

There are two specimens of this species, in the collection of the Ateneo de Manila, without locality label.

TROPIDOPHORUS MISAMINIUS Stejneger

Tropidophorus misaminius STEJNEGER, Proc. U. S. Nat. Mus. 34 (1908) 202.

Description of type.—(From Stejneger.) “Adult male. Upper head-shields smooth; fronto-nasal slightly longer than broad; prefrontals broadly in contact; frontal as long as fronto-parietals and interparietal together, in contact with three anterior supraoculars; five supraoculars, first longest, fifth smallest; two or three anterior superciliaries large, followed by six very small ones; none behind the suture between third and fourth

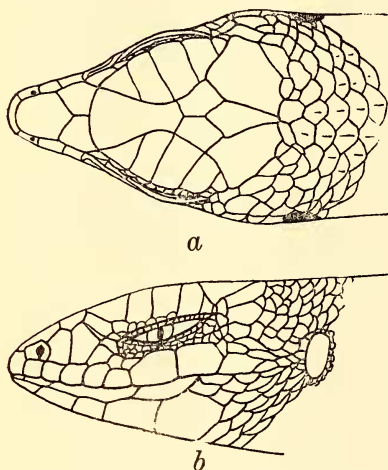


FIG. 45. *Tropidophorus misaminius* Stejneger; after Stejneger; a, head, dorsal view; b, head, lateral view; enlarged.

supraocular; fronto-parietals separate, shorter than interparietal; parietals not in contact behind interparietal; nostril in a single nasal, which is followed by two loreals, one behind the other; anterior row of temporals differentiated from the scales behind, the upper three being shorter and broader, the lower two long and narrow; eight supralabials, the anterior five low and subequal, the sixth suddenly much higher and twice as wide, seventh equaling sixth and with the latter entering the orbit, from which they are separated, however, by a single row of small scales as

large as the smaller superciliaries; a large unpaired postmental followed by three pairs of large submandibulars, the two anterior pairs of which are in contact on the middle line; ear-opening oval, erect, smaller than eye-opening; 32 scales around the middle of the body; dorsals, ten in the shielded part of the head, and laterals strongly keeled, not mucronate, the keels forming eight straight lines on the back; ventrals smooth, perceptibly smaller than the dorsals, twelve in a head length; a single, very large preanal plate; third finger almost as long as fourth; subdigital lamellæ smooth, 25 under the fourth toe; extended hind leg barely reaches the elbow; tail strongly compressed, with four strong

keels above at base, diminishing to two towards the middle, and with a medium series of wide smooth plates underneath; length of tail much less than twice the length of body."

Color (in alcohol).—"Above and on sides vandyke-brown, shiny on the head, dull on body and extremities; obscure traces of blackish cross-bars on the back and of vertical bars of pale spots on sides of body and tail; a blackish postocular streak below which on the temples a cluster of small whitish spots and a few scattered ones on the side of neck; underside shiny, chin, throat, lower neck, palm, soles, and posterior two-thirds of tail blackish brown, each scale with a narrow pale edge; rest of underside whitish."

Measurements of Tropicophorus misaminius Stejneger.

| | mm. |
|-----------------------------|------|
| Total length | 219 |
| Tip of snout to vent | 89 |
| Tip of snout to ear opening | 18 |
| Width of head | 12.5 |
| Vent to tip of tail | 130 |
| Foreleg | 26 |
| Hind leg | 41 |

Remarks.—The young differ in having the head shields slightly rugose. The color is lighter brown with better-defined crossbars; there is a whitish streak between eye and ear instead of spots; the chin and middle of throat whitish. Known only from Malindang Mountain, 338 meters altitude, Misamis Province, Mindanao. The type was collected by Dr. E. A. Mearns, on May 25, 1906. Two other specimens were also collected, one half grown and the other young.

Genus BRACHYMELES Duméril and Bibron

Brachymeles DUMÉRIL and BIBRON, *Erp. Gén.* 5 (1839) 776; GRAY, *Cat. Liz.* (1845) 98; COPE, *Ann. Report U. S. Nat. Mus.* (1900) 621; TAYLOR, *Philip. Journ. Sci.* § D 12 (1917) 267.
Senira GRAY, *Cat. Liz.* (1845) 98; COPE, *Ann. Report U. S. Nat. Mus.* (1900) 620.

Palatine bones meeting on the median line of palate which is toothless; lateral teeth conical; eye small, upper eyelid not developed, lower one more or less transparent; ear distinct or absent; nostril small, pierced in a small nasal or between first upper labial and supranasal; postnasal sometimes present; supranasals, prefrontals, frontoparietals, and interparietals present. Body elongate, limbs short, rudimentary, or absent; digits pentadactyl, tetradactyl, or wanting.

Boulenger lists a series of characters applicable to the whole genus. In many of the species now known these do not hold. The genus as here understood is the same as that defined by Boulenger; that is, it includes the genera *Brachymeles* Duméril and Bibron and *Senira* Gray. Regarding the fallacy of arranging the various forms of skinks on the development of the legs Boulenger * states the following:

In a family like the Scincoids, in which the limbs are undergoing a process of abortion, this character must be abandoned as one expressing relationship by itself; and I trust that the arrangement of the species in one or more series within a genus, passing from forms with well-developed pentadactyle limbs and lacertiform physiognomy to such as have rudimentary limbs, or even none at all, marks a great improvement upon the artificial classifications in use down to the present day.

Günther † also remarks upon this matter. Cope ‡ quite disagrees with Boulenger. He replies to Boulenger's statement as follows:

I am not prepared to admit that the above remarks of Dr. Boulenger have more than an application to the cases where the development of the limbs and digits is irregular in the same species. This has not been shown to be the case more frequently than we expected to find in all other zoölogical characters, and particularly those which we call generic. It is indeed precisely the grades of characters expressed by the last structural modification of parts that the generic nomenclature is created to record. So long as the characters are constant then it is necessary to designate them by generic terms, and I have therefore adopted in the following synopsis of genera those which have been proposed by my predecessors for the various degrees of development of the limbs and toes.

In the case of *Brachymeles* I am inclined to follow Boulenger. When his catalogue was published only four species of this Philippine genus were known; namely, three large pentadactyl forms, and a fourth with small stumplike limbs. Since 1912 I have discovered four new species, all of which are referable to this genus. One is pentadactyl, one tetradactyl, one has stumps of limbs, and the last is legless.

Taking *Brachymeles schadenbergi* as the most-specialized form of the genus (since in this species the leg development seems greatest; that is, the length of the hind leg is contained in the

* Cat. Liz. Brit. Mus. 3 (1887) 131.

† Proc. Zool. Soc. London (1871) 243.

‡ Op. cit. p. 618.

axilla-to-groin distance an average of only three and a quarter times), it is seen that the relative length of the body (axilla-to-groin distance) increases, and the length and development of the limbs decrease, proportionately, in each species of the series. Thus in *B. gracilis* the hind leg is contained in the axilla-to-groin distance an average of three and six-tenths times; in *B. bicolor*, seven times; in *B. eleræ*, nine and six-tenths times; in *B. bonitæ* and *B. burksi*, more than twenty-five times.

Four of the species are pentadactyl, one is tetradactyl, two have stumplike limbs with digits wanting, and one is legless. The genus is strictly Philippine, so far as is known. As yet no specimen has been taken in Palawan and the Calamian Islands. Due to the fact that the species are burrowing, they have remained but little known. It is highly probable that other intergrading species occur in the Islands, which will be found later.

Key to the Philippine species of Brachymeles Duméril and Bibron.

*a*¹. Legs pentadactyl.

*b*¹. Length of hind leg contained three to five times in distance between axilla and groin.

*c*¹. Second pair of chin shields broader than first, separated by one scale.

*d*¹. Hind leg in axilla-to-groin distance three to four times; auricular opening and eye well developed..... *B. boulengeri* sp. nov. (p. 246).

*d*². Hind leg in axilla-to-groin distance four to five times; auricular opening minute; eye very small..... *B. gracilis* (Fischer) (p. 247).

*c*². First pair of chin shields broader than second, in contact or separated; hind leg in axilla-to-groin distance three to four times; auricular opening and eye well developed.

B. schadenbergi (Fischer) (p. 249).

*b*². Length of hind leg in axilla-to-groin distance about seven times; first pair of chin shields broadest; largest species.

B. bicolor (Gray) (p. 251).

*a*². Legs tetradactyl; length of hind leg in axilla-to-groin distance nine to ten times; second pair of chin shields broadest.

B. eleræ Taylor (p. 254).

*a*³. Legs stumplike, digits wanting; legs contained in axilla-to-groin distance twenty-five or more times.

*b*¹. Second pair of chin shields broadest, separated by a single scale.

B. burksi Taylor (p. 255).

*b*². First pair of chin shields broadest; second pair separated by three scales..... *B. bonitæ* Duméril and Bibron (p. 256).

*a*⁴. Legs wanting; similar in form to the two preceding species.

B. vermis Taylor (p. 258).

BRACHYMELES BOULENGERI sp. nov.

PLATE 22, FIG. 2

Senira bicolor, part., GRAY, Cat. Liz. (1845) 98; GÜNTHER, Proc. Zool. Soc. London (1879) 76.

Brachymeles gracilis BOULENGER (non Fischer), Cat. Liz. Brit. Mus. 3 (1887) 387; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 270, 379; § D 13 (1918) 257.

Type.—No. 205, E. H. Taylor collection; collected on Polillo Island, July 15, 1920, by E. H. Taylor.

Description of type.—Rostral much broader than high, in contact with frontonasal, separating the two supranasals; frontonasal much wider than deep, in contact with frontal; prefrontals narrowly separated; frontal quadrangular, a little longer than wide; five supraoculars, the second the widest, the first broadly in contact with the prefrontal; frontoparietals four-sided, forming a median suture; interparietal small; parietals meeting behind the interparietal; nostril in a small nasal followed by a postnasal; two large loreal scales, the anterior largest; two

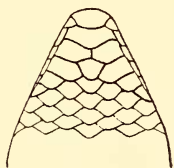


FIG. 46. *Brachymeles boulengeri* sp. nov.; chin shields; $\times 2$.

preoculars; six upper labials, the fourth entering the orbit; temporals not differentiated; mental much broader than deep; an azygous postmental; three pairs of chin shields, first pair in contact; second pair widest, separated by a single scale; third pair small; the scales on tip of snout thicker than others on head; legs small, pentadactyl, the foreleg fails to reach the ear by a distance equal to one-third to one-half its length; hind leg contained in axilla-to-groin distance about three and eight-tenths times; tail thick, partially regenerated; eight lamellæ under longest toe; preanals somewhat enlarged.

Color in life.—Above brown, each scale with a darker brown area; a lighter dorsolateral streak from head to tail not well defined; belly dirty yellow-brown.

Measurements of the type of Brachymeles boulengeri sp. nov.

| | mm. |
|------------------|------|
| Total length | 165 |
| Tail | 90 |
| Axilla to groin | 57 |
| Snout to foreleg | 25 |
| Foreleg | 10 |
| Hind leg | 15 |
| Width of head | 10.5 |

Variation.—I have examined large series of this species from Polillo, Los Baños, Mindoro, and Negros. They vary in the relation of the head scales. Thus, the supranasals are in contact in eleven specimens, in twenty-six they are separated; the prefrontals are never in contact; the parietals are in contact in nineteen specimens, separated in eighteen; frontoparietals separated in four specimens, in contact in thirty-three; the first pair of chin shields is in contact in twenty-nine specimens, separated narrowly in eight. The distance from snout to foreleg is contained in axilla-to-groin distance 2.1 to 2.6 times (average 2.46); the length of hind leg in axilla-to-groin distance, 3 to 4.3 times, the average being 3.6 times. The size and arrangement of the second pair of chin shields are invariable in all specimens examined. The variation in relative proportion of leg and body length is due largely to the age of the specimens. Scale rows vary from 24 to 28. A specimen from Canlaon Volcano, Negros, has 30. Sometimes the fourth labial is broken and the fourth and fifth enter orbit.

Remarks.—This species was regarded as identical with *Brachymeles gracilis* (Fischer) due to the fact that I did not have Fischer's original description at hand, but depended on Boulenger's Catalogue for the identification of the species. I have recently obtained a photographic copy of Fischer's work and find that *Brachymeles suluensis* Taylor is identical with *B. gracilis* (Fischer) and that the species which Boulenger calls *B. gracilis* is the species here described but most certainly not *B. gracilis* (Fischer). I have named the species for Dr. G. A. Boulenger, the eminent herpetologist of the British Museum. Note the comparative measurements at the end of the description of *Brachymeles gracilis* in this work.

BRACHYMELES GRACILIS (Fischer)

Eumeces (Riopa) gracilis FISCHER, Jahrb. wiss. Anst. Hamburg 2 (1885) pl. 3, fig. 1.

Brachymeles suluensis TAYLOR, Philip. Journ. Sci. § D 13 (1918) 254.

Description of species.—(From No. 1666,* Bureau of Science collection; collected on Bubuan Island,† Tapiantana group, Sulu, September, 1917, by E. H. Taylor.) Snout blunt, rather flattened; rostral bent back over end of snout, forming a moderate

* Type of *Brachymeles suluensis* Taylor.

† There are several islands in the Sulu Archipelago by this name. One is in the Tapiantana group, and a second lies to the south in the Tapul group.

suture with frontonasal; latter longer than broad, narrowly separated from frontal; prefrontals narrowly in contact, wider than deep, touching both frenals, first superciliary, and first supraocular; frontal large, a little longer than broad, in contact with two supraoculars, narrowly in contact with interparietal; latter little longer than wide, much larger than frontoparietals which are nearly square; parietals elongate, narrowly in contact behind interparietal; no nuchals; nostril pierced in a minute nasal, followed by a small postnasal; anterior frenal nearly twice as large as second and very much higher; a small preocular between first superciliary and third labial; five supraoculars, second largest and widest; five or six superciliaries; six upper labials, first very large, fourth below eye entering

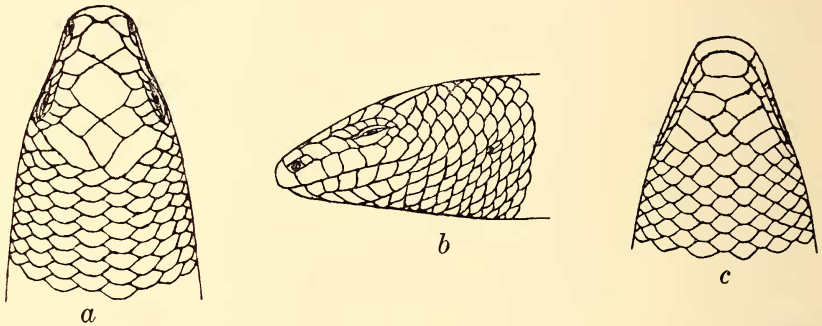


FIG. 47. *Brachymeles graciis* (Fischer); a, head, dorsal view; b, head, lateral view; c, chin; $\times 3$.

orbit; two small scales above fifth labial, bordering orbit; mental deeper than postmental but not as wide; three pairs of chin shields, first pair in contact, second pair widest, separated by a single scale; third pair separated by three scales; ear opening minute, nearer end of snout than foreleg; twenty-four rows of smooth scales around body; preanals not or but slightly enlarged; limbs pentadactyl, the anterior very short, reaching slightly more than halfway to ear; three scales above longest finger and an equal number of subdigital lamellæ, five under longest toe; third and fourth toes subequal in length; hind leg contained in axilla-to-groin distance five times.

Color in life.—Above and below yellowish brown, each scale with a large brown spot; a lighter stripe from behind eye to hind leg, also with small, irregular spots and dots; head rather uniform brown; scales on tip of snout milky white; chin shields rather yellowish; tail same as body.

Measurements of Brachymeles gracilis (Fischer).

| | mm. |
|------------------|-----|
| Total length | 117 |
| Snout to vent | 81 |
| Snout to foreleg | 19 |
| Tail broken | 36 |
| Axilla to groin | 55 |
| Width of head | 6.3 |
| Foreleg | 6 |
| Hind leg | 11 |

Remarks.—Only one specimen was found. It is an adult female containing two embryos, 46 millimeters long. In one the frontonasal and frontal are broadly in contact. The arrangement of chin shields is identical with that in the mother. The lateral stripes are prominent. This species forms another link in the chain of retrogression in the genus *Brachymeles*. It stands between *Brachymeles schadenbergi* and *B. bicolor*, and differs from both in the degree of development of the limbs and the relative length of the body.

As compared with *B. boulengeri* the following differences are evident: The eye is very much smaller and apparently can open but very slightly; the lid is opaque and probably not movable. In *B. boulengeri* the eye is of considerable size and the eyelid moves so as to expose the eyeball. The ear opening in *B. gracilis* is minute, scarcely visible.

Comparative measurements of Brachymeles boulengeri sp. nov. and Brachymeles gracilis (Fischer).

| | <i>B. boulengeri.</i> mm. | <i>B. gracilis.</i> mm. |
|------------------|------------------------------|----------------------------|
| Snout to vent | 81 | 81 |
| Snout to foreleg | 22 | 19 |
| Axilla to groin | 50 | 55 |
| Width of head | 10 | 6.3 |
| Height of head | 9 | 5 |
| Snout to ear | 12 | 10 |
| Foreleg | 10 | 6 |
| Hind leg | 17 | 11 |

BRACHYMELES SCHADENBERGI (Fischer)

PLATE 22, FIG. 1

Senira bicolor, part., GRAY, Cat. Liz. (1845) 98.

Eumeces (Riopa) schadenbergi FISCHER, Jahrb. wiss. Anst. Hamburg 2 (1885) 87, pl. 3, fig. 2.

Brachymeles schadenbergii BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 386.

Brachymeles schadenbergi TAYLOR, Philip. Journ. Sci. § D 12 (1917) 268.

Description of species.—(Described from twenty specimens from Mindanao.) Rostral large, longer than wide, pointed behind, in contact with frontonasal in seven specimens, separated in thirteen specimens; supranasals present, either in contact or separated; frontonasal usually broader than wide; prefrontals constantly separated, having frontal narrowly in contact with frontonasal; frontal large, longer than broad, or equal, constantly in contact with two supraoculars; frontoparietals usually in contact (two specimens show exception), as broad as long, or a little broader; interparietal large, longer than broad, with a whitish "eye-spot;" parietals not forming a suture behind interparietal (one exception); no nuchals; nostril pierced in

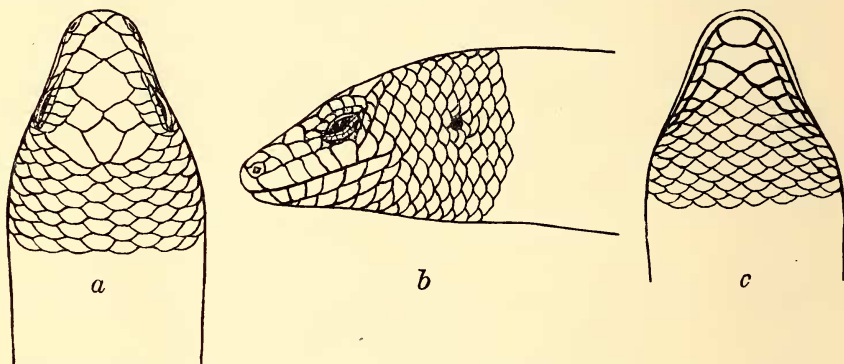


FIG. 48. *Brachymeles schadenbergi* (Fischer); a, head, dorsal view; b, head, lateral view; c, chin; $\times 2$.

a small nasal which is followed by a small postnasal; two frenals, first much higher than wide; second lower than first, nearly square; two small preocular scales; five supraoculars, second widest; six superciliaries; six or seven upper labials, fourth entering orbit (two specimens have a fifth), first largest; four subequal scales at posterior corner and below eye; temporal scales slightly enlarged; mental large, somewhat rectangular; five to seven, usually six, lower labials; an undivided postmental, wider than deep; first pair of chin shields wider than second pair, in contact or not (ten specimens in contact, ten separate); rostral, mental, first upper and first lower labials, nasal, postnasals, and internasals all apparently thickened, and lighter in color; eye small, its orbital diameter equals one-half its distance from snout; distance from eye to auricular opening greater

than distance from eye to nostril; auricular opening small, about halfway between end of nose and insertion of foreleg; foreleg pressed forward fails to reach auricular opening in large specimens, but does so reach in some younger specimens; front leg followed by a slight lateral depression into which it is usually folded; distance from end of snout to insertion of arm contained in distance from axilla to groin from 2 to 2.6 times (average 2.3); length of hind leg contained in this distance from 3 to 4 times (average 3.25); limbs pentadactyl, with unicarinate lamellæ, six under the longest finger, eight under longest toe; third and fourth toes practically equal, although sometimes fourth is slightly longer, sometimes third; preanal scales slightly enlarged; twenty-six to twenty-eight rows of scales about body (seventeen specimens twenty-eight, three specimens twenty-six); scales of back part of body frequently dimly tricarinate; tail is 1.1 times length of body.

Color in life.—Above brown, each scale with a darker brown area, covering eight scale rows; laterally and ventrally brownish yellow with some lateral scales flecked with the darker brown of the dorsal color; scales of belly sometimes flecked with brown; scales under tail usually with darker spots; head and upper labials usually darker brown, with the scales on end of snout lighter.

Measurements of Brachymeles schadenbergi (Fischer).

| | Largest specimens. | Average of eight nearly equal-sized specimens. |
|------------------|-----------------------|---|
| | mm. | mm. |
| Total length | 220 | 206 |
| Snout to vent | 112 | 99 |
| Tail | 108 | 106 |
| Snout to foreleg | 31 | 29 |
| Axilla to groin | 71 | 64 |
| Foreleg | 13 | 12.5 |
| Hind leg | 20 | 19 |

Remarks.—This species is common in Mindanao. Most of the specimens examined are from Agusan River Valley. The female gives birth to from two to five young. It is a burrowing form, and is usually found under logs or trash.

BRACHYMELES BICOLOR (Gray)

PLATE 13, FIG. 1, AND PLATE 22, FIG. 3

Senira bicolor, part, GRAY, Cat. Liz. (1845) 98.

Brachymeles bicolor BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 388;
CASTO DE ELERA, Cat. Fauna Filipinas 1 (1895) 422; TAYLOR,
Philip. Journ. Sci. § D 12 (1917) 272, pl. 1, fig. 3; text fig. 3.

Description of species.—(Described from an unnumbered specimen in Santo Tomás Museum, Manila; locality "Filipinas.") Rostral very much broader than deep, not touching frontonasal; internasals large, broadly in contact behind rostral and forming their longest suture with frontonasal; latter much broader than deep, in contact with one frenal, and with frontal at a single point; prefrontals large, minutely separated, wider than deep; frontal longer than wide, rather pointed in front, touching two supraoculars; two frontoparietals, a little wider than deep, broadly in contact behind frontal; two very elongate parietals lying diagonally, nearly three times as long as wide, forming a suture behind interparietal; latter longer than broad; a pair of nuchals, narrow and elongate; a large, elongate temporal borders parietal; nasal extremely small, only a ring about nostril;

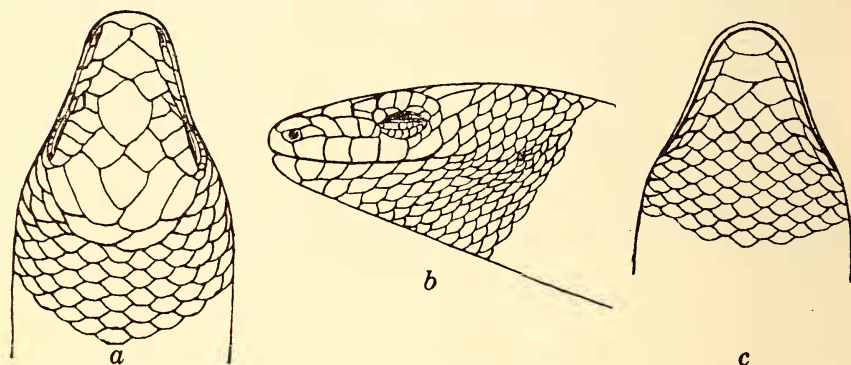


FIG. 49. *Brachymeles bicolor* (Gray); a, head, dorsal view; b, head, lateral view; c, chin: $\times 2$.

a postnasal of nearly same size; two large frenals, first higher than wide, second nearly square; a preocular directly in front of eye; five supraoculars, second longest, and arranged as in other members of the genus, two in contact with frontal; a few small scales below orbit, above labials; six superciliaries; six upper labials, first largest, not touching internasal, fourth under eye, first four of nearly same size; two or three scales in temporal region enlarged; six lower labials; mental broader than deep, rather rectangular; postmental single, wider than deep; first pair of chin shields in contact, wider than second pair; latter small, separated by three scales (like the arrangement in *B. schadenbergi*); ear opening greatly reduced; twenty-eight rows of scales around body; anals not or scarcely enlarged; legs small, five fingers and toes present, all clawed; lamellæ below

digits feebly compressed and unicarinate; limbs rather broadened at base; hind leg contained in distance from axilla to groin 7.4 times; tail broken and partial regeneration begun.

Color in alcohol.—Above dark red-brown covering ten scale rows, each scale with a darker brown spot, which is not readily discerned; head and upper parts of legs brown; laterally and ventrally the color is yellowish to brownish white, distinctly contrasted with the color above.

Measurements of Brachymeles bicolor (Gray).

| | mm. |
|--|-----|
| Total length, tail partially regenerated | 215 |
| Snout to vent | 155 |
| Width of body | 18 |
| Width of head | 14 |
| Snout to ear | 15 |
| Snout to eye | 6 |
| Snout to foreleg | 32 |
| Axilla to groin | 112 |
| Foreleg | 8 |
| Hind leg | 15 |

Remarks.—The specimen here described contained two embryos, almost fully matured. They measure 90 and 86 millimeters, respectively; the heads are 6.5 millimeters wide; snout to vent, 48; hind leg, 6. The head scales are identical with those of the mother save that the interparietals are a little wider than deep; the nuchals are present in one specimen, in the other they are broken. I am inclined to regard the presence of the nuchals as a normal character, although the type does not show them. This species is apparently very rare. I have been unable to find it, and there is no specimen in the Bureau of Science collection. I believe that it is an inhabitant of northern, central, and eastern Luzon.

It is the largest known species of the genus and is readily recognized by the elongate body. Boulenger gives the following measurements of the type:

Measurements of the type of Brachymeles bicolor (Gray).

| | mm. |
|---------------|-----|
| Total length | 315 |
| Head | 18 |
| Width of head | 13 |
| Body | 137 |
| Foreleg | 11 |
| Hind leg | 17 |
| Tail, injured | 160 |

BRACHYMELES ELERÆ Taylor

PLATE 22, FIG. 4

Brachymeles eleræ TAYLOR, Philip. Journ. Sci. § D 12 (1917) 273; pl. 1, fig. 4, text figs. 4, 5.

Description of species.—(From the type, an unnumbered specimen in Santo Tomás Museum; collector unknown; labeled, "Filipinas.") Rostral but little wider than deep, bending back somewhat over end of snout, broadly in contact with fronto-nasal; supranasals reduced, separated, in contact with first labials; frontonasal nearly as long as broad, narrowly in contact with frontal; latter longer than broad, produced to a point in front, in contact with two supraoculars; frontoparietals quadrangular, moderate, separate; frontal touches interparietal

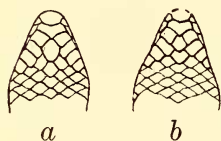


FIG. 50. *Brachymeles eleræ* Taylor; a, chin shields of the type; b, chin shields of the cotype; $\times 2$.

which is diamond-shaped; parietals elongate, three times as long as wide; nasal minute, a mere rim around nostril; two frenals, first higher than wide, second almost square; one large preocular; five supraoculars, second widest; six superciliaries; six upper labials, first largest, fourth entering orbit; one pair of nuchals present; temporals somewhat enlarged, largest bordering parietal; mental quadrangular, wider than deep; one postmental, wider than deep; first and second pairs of chin shields divided by a single, median, much-enlarged scale, second pair somewhat broader than first pair, third pair divided by three scales; legs much reduced, each with four diminutive, clawed digits; ear opening wanting; two preanals, distinctly enlarged; eye rather small; twenty-four scale rows around anterior part of body, twenty-two about middle; hind leg contained about ten times in distance from axilla to groin.

Color in alcohol.—Very light yellowish brown, each scale with a dark brown spot, forming longitudinal dotted lines on each scale row; dots below smaller and not so distinct as above.

Measurements of Brachymeles eleræ Taylor.

| | Type. mm. | Cotype. mm. |
|------------------|--------------|----------------|
| Total length | 128 | 108 |
| Snout to vent | 68 | 63 |
| Width of body | 6 | 6 |
| Width of head | 5.1 | 5 |
| Axilla to groin | 51 | 44 |
| Snout to foreleg | 15 | 12 |
| Foreleg | 3.5 | 3.1 |
| Hind leg | 5.2 | 4.6 |

Variation.—The cotype in Santo Tomás Museum is in the same container, and is probably from the same locality. Its measurements are included in the preceding table.

The two specimens agree very well save that in the cotype the scale dividing the first pair of chin shields is smaller, and the second pair is divided by another scale. This is probably the normal condition. While no locality is given, I am assured by the director of the museum that the specimens are from Nueva Vizcaya, Luzon.

Remarks.—Superficially this species resembles *Lygosoma lineatum* Gray, and thus the specimens were found labeled. In common with the latter, *Brachymeles eleræ* has four digits on the legs, and the coloring and markings are strikingly similar; but here the resemblance ceases. It has no close affinity in the genus.

BRACHYMELES BURKSI Taylor

PLATE 22, FIG. 5

Brachymeles burksi TAYLOR, Philip. Journ. Sci. § D 12 (1917) 275.

Description of species.—(From the type, No. 700, E. H. Taylor collection; collected at Sumagui, on the Liddell Plantation, eastern coast of Mindoro, May 4, 1916, by E. H. Taylor.) General appearance rather wormlike; head pointed bluntly; rostral large, visible above for nearly half its length, rather broadly in contact with frontonasal; nostril in a minute nasal between first labial, supranasal, and rostral; supranasal in contact with largest frenal and first labial; scales on point of snout thickened and of lighter color; frontonasal a little broader than long, narrowly in contact with frontal, which is slightly longer than broad, and in contact with first and second supraoculars; prefrontals rather rectangular, touching two frenals, first superciliary, and first supraocular; four supraoculars, second widest, last smallest; four or five superciliaries; frontoparietals somewhat rectangular, little larger than prefrontals, touching two supraoculars; interparietal a little longer than broad, narrowly in contact with frontal; parietals more than twice as long as wide, in contact behind interparietal, touching two supraoculars, two temporals, and an elongate nuchal; two frenals, and a small preocular before eye; no postnasal; six upper labials, fourth entering orbit; six lower labials; mental moderate, thickened, wider than high; an unpaired postmental, followed by three pairs of chin shields, none of which is in contact, second pair widest; two temporals between parietal and sixth labial; twenty-four scale rows; two distinctly enlarged



FIG. 51. *Brachymeles burksi* Taylor; chin shields; $\times 2$.

preanals; eye small; ear completely hidden; legs reduced to scaled, stumplike rudiments with no indication of digits; length snout to foreleg contained four and five-tenths in distance between axilla and groin.

Color in life.—Above and below dark (sometimes purplish) brown, each scale having a darker area with the edges somewhat lighter; end of snout grayish.

Measurements of Brachymeles burksi Taylor.

| | mm. |
|--|------|
| Total length, tail partially regenerated | 103 |
| Snout to vent | 73.5 |
| Axilla to groin | 60 |
| Snout to foreleg | 13.5 |
| Width of head | 4.5 |
| Width of body | 5.4 |
| Foreleg | 1.1 |
| Hind leg | 1.3 |

Variation.—Very little variation is evident; most of the specimens have twenty-two instead of twenty-four scale rows; one specimen has only five upper labials, the third entering the orbit.

Remarks.—Several specimens were taken on the eastern coast of Mindoro at Sumagui, on the Liddell Plantation; ten others were taken near Calapan on the northern coast. They were found burrowing under logs and rotting wood. The females give birth to two young. Embryos taken from one female measured 56 and 54 millimeters, respectively; they seemed almost entirely developed. Known only from Mindoro.

This species is closely related to *Brachymeles bonitæ*, but differs from it in the following characters: The limb stumps are even more reduced; the prefrontals and frontoparietals are smaller; nuchals are present; the mental is much smaller, and the postmental is in contact with two scales instead of one; the second pair of divided chin shields is broader than the first pair, and is separated by a single scale.

BRACHYMELES BONITÆ Duméril and Bibron

PLATE 22, FIG. 6

Brachymeles bonitæ DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 777; GRAY, Cat. Liz. (1845) 98; BOETTGER, Ber. Senck. Nat. Ges. (1886) 103; BOULENGER, Cat. Liz. Brit. Mus. 3 (1887) 388; TAYLOR, Philip. Journ. Sci. § D 12 (1917) 276.

Description of species.—(Described from No. 1151, E. H. Taylor collection; collected at Los Baños, Laguna, Luzon, on the side of Mount Maquiling, elevation about 100 meters, April 10, 1916, by E. H. Taylor.) Rostral large, triangular, about as high as

wide; supranasals present, large, separated, in contact with first labial behind nostril; frontonasal large, a little wider than long, in contact laterally with a single frenal, forming sutures with rostral and frontal; prefrontals separated, in contact laterally with frenals and first superciliary; frontal about as broad as long, in contact with two supraoculars and narrowly with interparietal; frontoparietals rather large, separated; parietals about three times as long as wide, forming a suture behind interparietal; nostril pierced in a minute nasal; no postnasal; first labial in contact with internasal; two enlarged frenals; five superciliaries; four supraoculars, second widest; six supra-

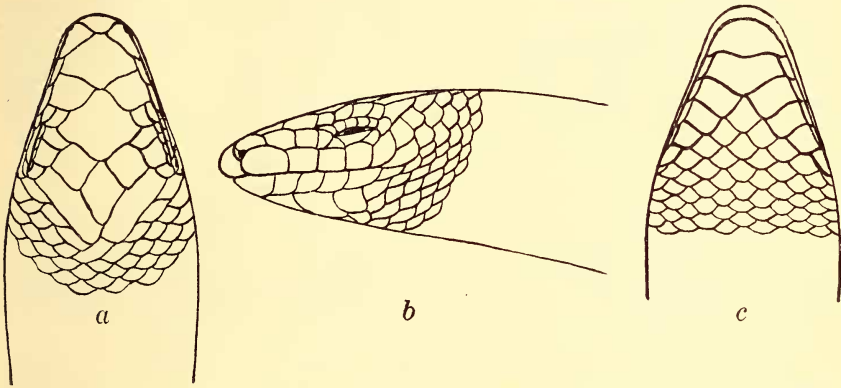


FIG. 52. *Brachymeles bonitæ* Duméril and Bibron; a, head, dorsal view; b, head, lateral view; c, chin; $\times 5$.

labials, fourth entering orbit; temporals enlarged; nuchals slightly enlarged; mental large, followed by an enlarged postmental, which is in contact with a single lower labial; four pairs of divided chin shields, first largest and widest, fourth pair very small; ear hidden; legs reduced to stumps, with no digits; twenty-six rows of scales about body; eye small; scales on point of snout thickened; length of legs twenty-eight times in axilla-to-groin distance; preanals not enlarged.

Color in life.—Uniform purplish brown, lighter on throat and chin. Scales on snout lighter than other head scales.

Measurements of Brachymeles bonitæ Duméril and Bibron.

| | mm. |
|--------------------------|------|
| Length, tail regenerated | 113 |
| Length of head | 9 |
| Width of head | 5.5 |
| Axilla to groin | 65 |
| Foreleg | 2.3 |
| Hind leg | 2.3 |
| Snout to foreleg | 13.5 |

Remarks.—This species stands much in the same relation to *B. burksi* that *B. schadenbergi* does to *B. gracilis*. The following differences between the two species are noted: The mental is larger in *B. bonitæ*, the arrangement of the chin shields is essentially different, and the postmental is in contact with a single labial, instead of with two labials as in *B. burksi*. Several other minor differences are evident on a comparison of the two species.

As compared with the specimen reported by Boulenger the following variations are evident: The distance between end of snout and foreleg is contained 4.8 in distance between fore and hind legs instead of 4.5 times; there are two more rows of scales about body. In fact, the specimen described by Boulenger more closely resembles *B. burksi* than *B. bonitæ*. Unfortunately, Boulenger failed to mention the submandibular scalation, which is very important in determining these species.

BRACHYMELES VERMIS Taylor

Brachymeles vermis TAYLOR, Philip. Journ. Sci. § D 13 (1918) 255.

Description of species.—(From the type, No. 2000, Bureau of Science collection; collected at Bubuan, Sulu, 1917, by E. H.

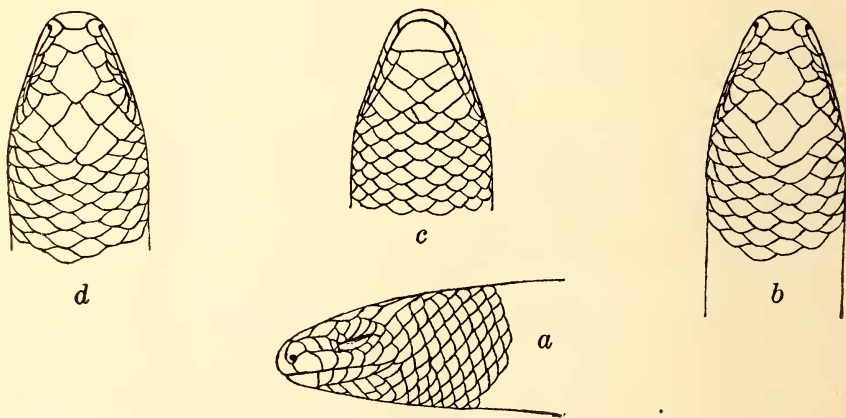


FIG. 53. *Brachymeles vermis* Taylor, from Sulu; a, head, lateral view; b, head, dorsal view (normal); c, chin; d, head, dorsal view (variation of Papahag specimen); $\times 4$.

Taylor.) Rostral about as high as wide, bending back over point of snout, visible above by more than half its height; frontonasal broader than deep, broadly in contact with rostral, narrowly with frontal; prefrontal wider than long, narrowly separated, touching two frenals, first superciliary and first supraocular; frontal slightly longer than wide, in contact with two

supraoculars and interparietal; latter with a prominent "eye-spot," longer than broad, inclosed by parietals, larger than frontoparietals; latter separated, touching two supraoculars; a pair of nuchals present; parietals more than three times as long as wide; five supraoculars, first largest, second widest, last three touching parietal; nostril pierced between large supranasal and first labial; if a nasal scale is present it is indistinguishable; two frenals, first nearly twice as large as second; one large preocular; only two anterior superciliaries distinguishable; six upper labials, first very large, third and fourth below eye; a large scale partially inserted between fourth and fifth labials; mental large, extending back to near vertical of suture between first and second upper labials; four lower labials; postmental smaller than mental, touching one labial; three pairs of chin shields, none in contact, second pair broadest, first two pairs separated by a single scale, third pair by three scales; temporals slightly enlarged, two touching parietal; one pair of nuchals bordering parietal; twenty-two scale rows around body, all smooth; preanals slightly enlarged; no legs; a slight depression on either side of anus with two or three elongate scales; no auricular opening; scales on anterior part of snout thickened.

Color in life.—Above light brown, each scale with a darker brown spot, making broken, longitudinal, dotted lines; belly and tail same, slightly lighter.

Measurements of Brachymeles vermis Taylor.

| | mm. |
|---------------|-----|
| Total length | 144 |
| Snout to vent | 86 |
| Tail | 58 |
| Width of head | 4 |
| Width of body | 5 |

Variation.—Specimens were obtained in four localities: Bitinan, 3 specimens; Lapac, 4; Bubuan (southern island), 3; and Papahag, 4. All show variation. The Bitinan specimens have twenty-four scale rows; two have the nuchal much elongate, and only one temporal touching the parietal. The Lapac specimens have twenty-six scale rows; one specimen has the parietal broken on one side. Of the Bubuan specimens, the type and two cotypes have only twenty-two scale rows. All of the Papahag specimens have the parietal broken in two parts. The first pair is small, about the size of the prefrontals; the second posterior pair elongate, forming the normal postinterparietal suture; they

have twenty-two to twenty-four scale rows about the body. There is no other variation of note and, were it not that this same variation occurs in one of the Lapac specimens, I should regard the form with two pairs of parietals as a distinct subspecies.

Remarks.—This species is closely related to *Brachymeles burksi* Taylor and *B. bonitæ* Duméril and Bibron. It carries the retrogression of the genus another step, and we find the devolution complete from the most highly developed forms, *B. gracilis* and *B. schadenbergi*, with well-developed pentadactyl limbs, to this small legless species.

DIBAMIDÆ

Dibamidæ BOULENGER, Ann. & Mag. Nat. Hist. V 14 (1884) 120.

“Tongue short, bifid posteriorly, pointed, undivided in front, covered with curved lamellæ or plicæ. Teeth small, pointed, hooked, none on palate. Skull compact; no interorbital septum; no columella cranii; no arches; no infraorbital foramen; præmaxillary double. Limbs absent, the hind pair represented, in the male, by a pair of flaps on the sides of the anal opening; no rudiments of the sternal apparatus. Body vermiform, covered with cycloid imbricate scales. No osteodermal plates. Eyes concealed under the skin. No ear-opening. No præanal pores.” (*Boulenger.*)

One genus is known.

Genus DIBAMUS Duméril and Bibron

Dibamus DUMÉRIL and BIBRON, Erp. Gén. 5 (1839) 833; GRAY, Cat. Liz. (1845) 129.

Typhloscincus PETERS, Mon. Berl. Ak. (1864) 271.

Rhinophidium STEINDACHNER, Novara Exped., Rept. (1869) 52.

Snout normally covered by three large shields; namely, rostral, and a labial on each side which, however, may fuse into a single shield; nostril pierced in rostral, with a straight horizontal suture behind it; limbs totally absent in female, the hind pair represented in the male by two flaplike rudiments; no preanal pores; eggs with calcareous shell, not circular.

There are three species of the genus known, only one of which enters our territory. The genus is widely distributed from Sumatra to New Guinea, the Nicobars, Borneo, and the Philippines.

DIBAMUS ARGENTEUS Taylor

Dibamus argenteus TAYLOR, Philip. Journ. Sci. § D 10 (1915) 107, pl. 1, figs. 11, 12; 12 (1917) 379; 13 (1918) 257.

Description of species.—(From the type, No. 1691, Bureau of Science collection; collected at Butuan, Agusan, Mindanao, May, 1913, by E. H. Taylor.) Body wormlike; snout covered with a single large rostral shield; nostril pierced near anterior part of snout with a suture issuing from it, continuing back, first curved and then as a straight line, to edge of rostral at point opposite eye; frontal shaped like a double convex lens, forming curved sutures with rostral and interparietal, in contact laterally with ocular; interparietal larger than frontal, rather convex on anterior side, bordered laterally by oculars and postoculars, behind by five body scales; oculars elongate, eye discernible; a single enlarged scale follows rostral above angle of jaws; mental narrow, longer than wide; one lower labial on each side extending back farther than rostral; a single, slightly enlarged scale following mental; two small, vertically elongate scales behind first lower labial, bordering first upper labial below; scales on snout and lower jaw noticeably thickened; twenty-four scale rows around body; 250 scales in a longitudinal row from head to tail; scales bordering anus very small, but preceded by two or three enlarged scales; forty scales in a line from anus to tip of tail; tail blunt, its length contained in length from snout to vent 6.36 times.

Color in life.—Light chocolate brown above and below, with two irregular blotches of silver gray, which encircle the body; anal region creamy white; frontal plate silvery; rostral, mental, and lower labials light.

Measurements of Dibamus argenteus Taylor.

| | mm. |
|---------------|-----|
| Total length | 125 |
| Snout to vent | 108 |
| Tail | 17 |
| Width of head | 4.5 |

Variation.—Four other specimens have been found and referred to this species since the type was discovered. Two of these are from Negros; the third from Papahag, Sulu, and the fourth from the coast of Borneo, near Tunku Point. The Negros specimens differ from the typical form in having the rostral broken in three scales and forming a large upper labial on either side posterior to nostril; there are two postoculars instead

of one; there are five body scales bordering the interparietal, seven including the superior postoculars; the rostral is somewhat rugose; there are twenty-four and twenty-six scale rows about the body; both specimens are females; the largest measures 154 millimeters, and the tail length is contained in distance from snout to vent 6.7 times. The silver blotches are confined to the anal region and the tail; the head is widened behind the angle of the mouth.

The Papahag specimen is a male and consequently differs from the preceding specimens in the presence of leg rudiments; these are small flaps about 3 millimeters long which fold back, their tips almost in contact behind the anus; they are covered with scales; the terminal scale is single; the preanal scales are drawn out to a sharp point, the scales bordering the anus small, with two much-enlarged scales behind them, between the bases of the leg rudiments; there is a single postocular; the prefrontal is proportionately narrower than the interparietal; two large silver blotches are present, one on the anterior part of the body, the second on the tail; the tail length is contained in the body length 6.7 times. The Bornean specimen is very small, but has the silver blotches.

Remarks.—All the specimens were found under fallen logs, except the Bornean specimen, which was found burrowing in sand at the base of a tree.

This species differs from *Dibamus novæ-guinea* in the markings and the proportionately longer tail. In *D. novæ-guinea* the length of the tail is contained in the body more than nine times. The length of the frontal and the interparietal together is invariably less than the length of the rostral from the frontal to the end of the snout.

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Fig. 1. *Gekko monarchus* (Duméril and Bibron). 2. *Gymnodactylus agusanensis* Taylor.

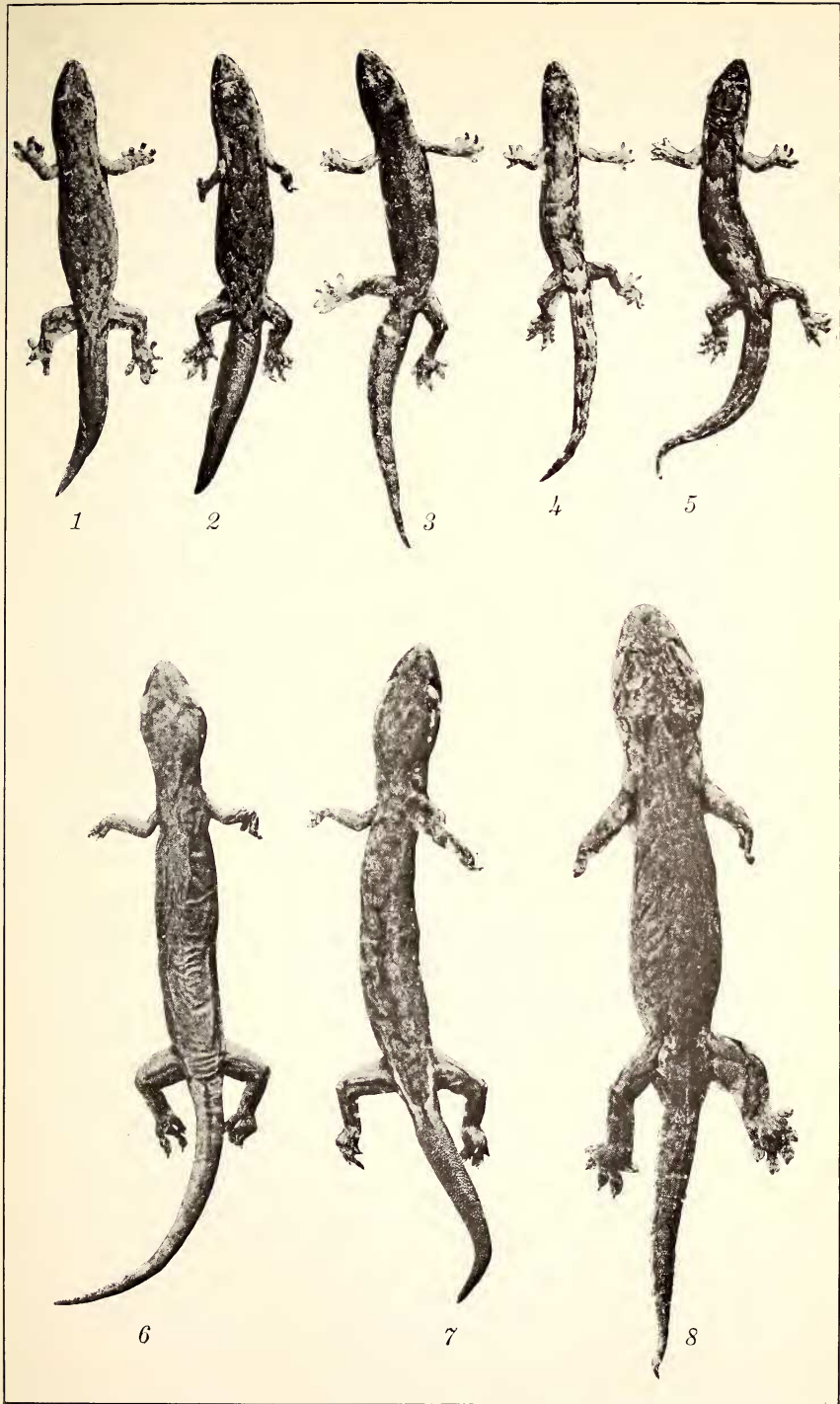


PLATE 2. PHILIPPINE GECKOS.

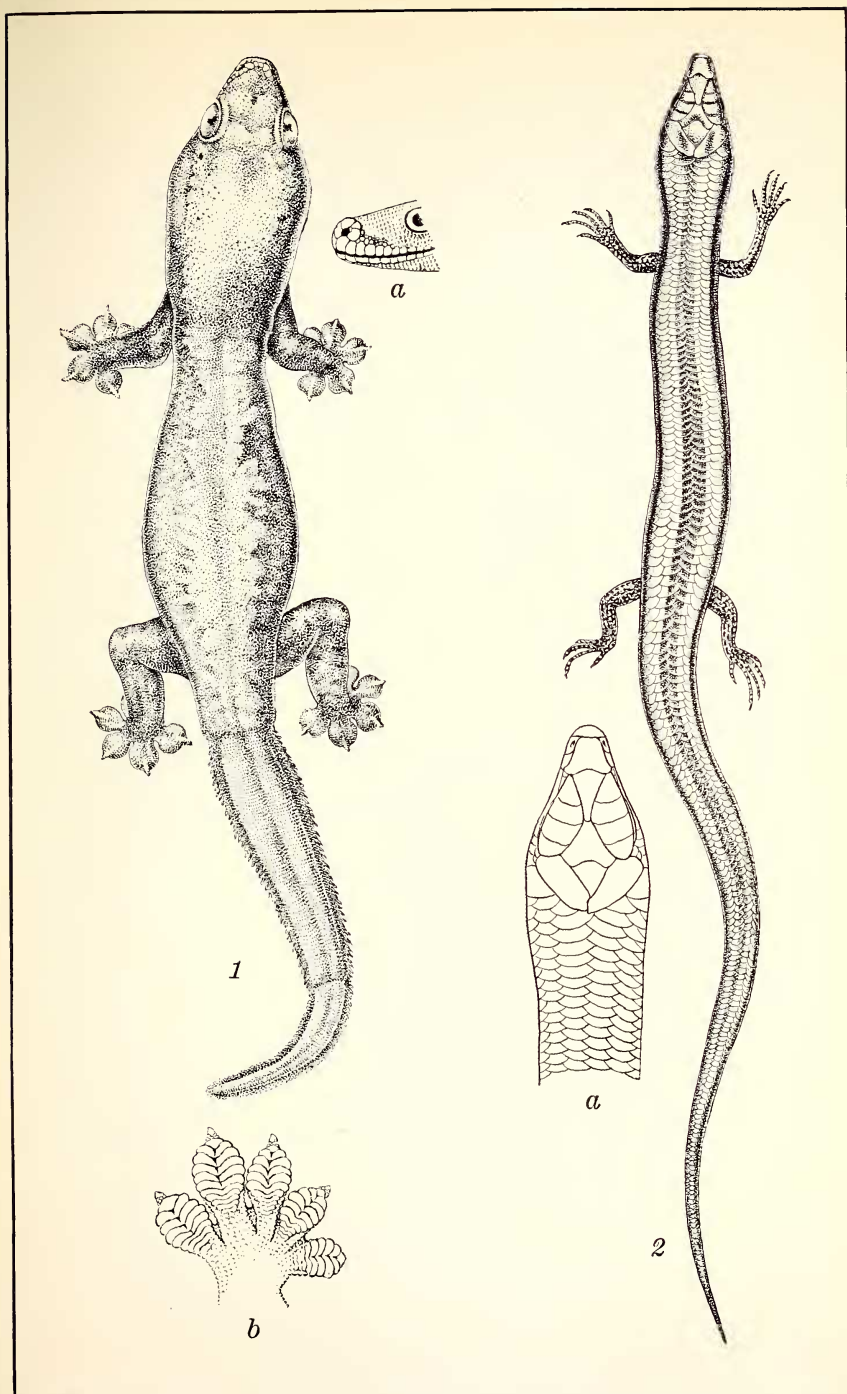


Fig. 1. *Lepidodactylus christiani* Taylor. 2. *Siaphos auriculatum* Taylor.

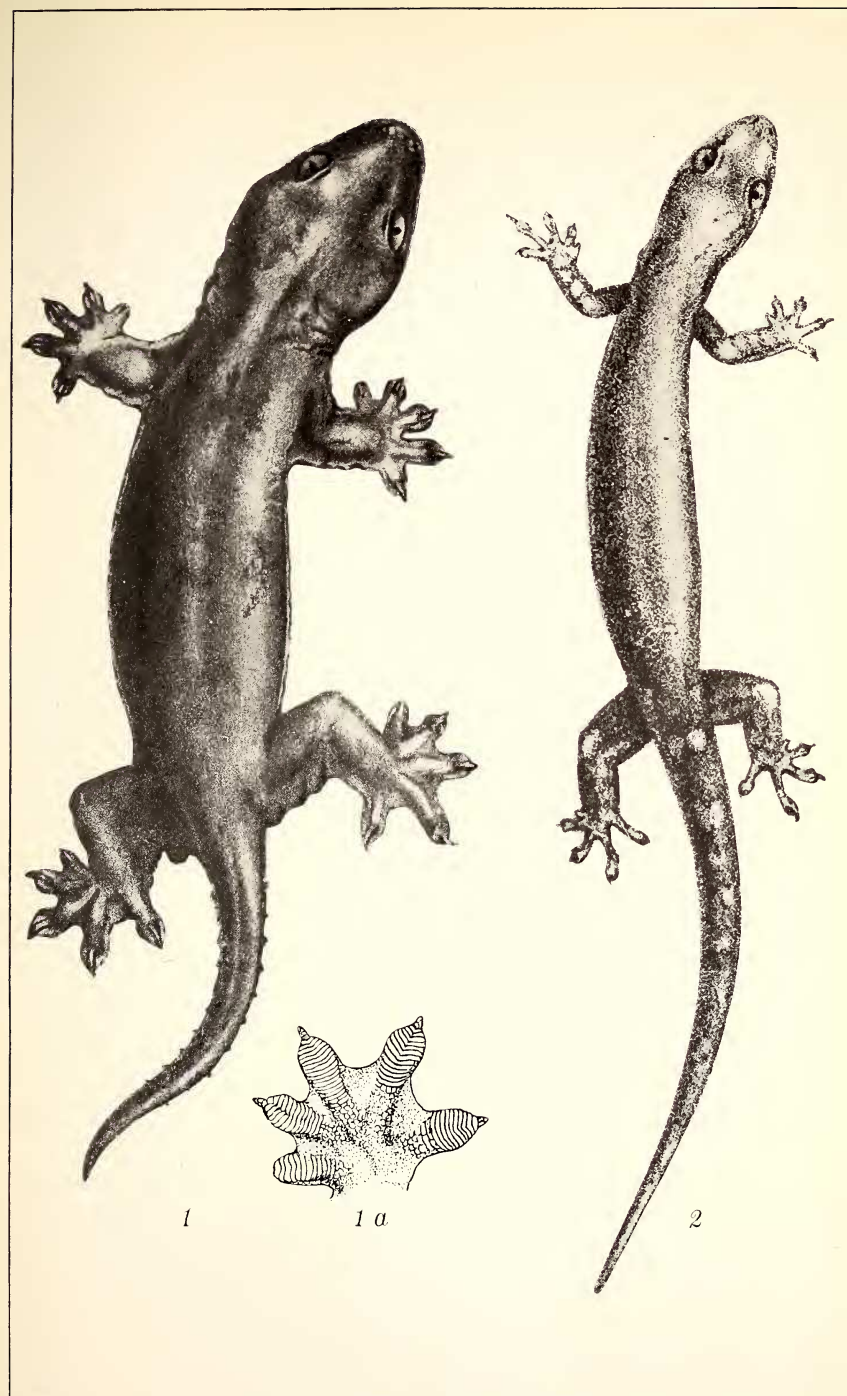


Fig. 1. *Luperosaurus cumingii* Gray. 2. *Hemiphyllodaetylus typus* Bleeker.



PLATE 5. PTYCHOZOOM INTERMEDIA TAYLOR.

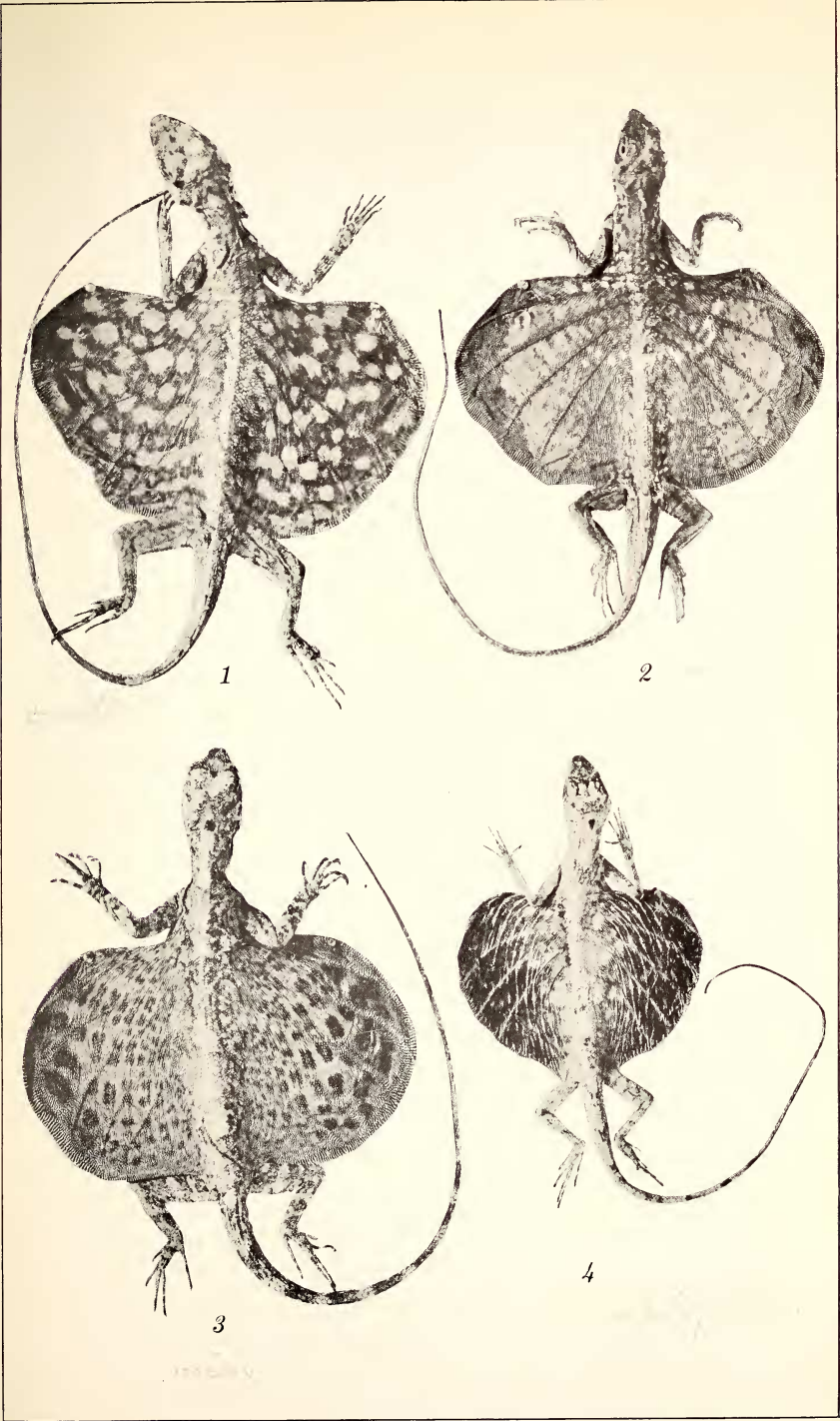


PLATE 6. PHILIPPINE DRACOS.

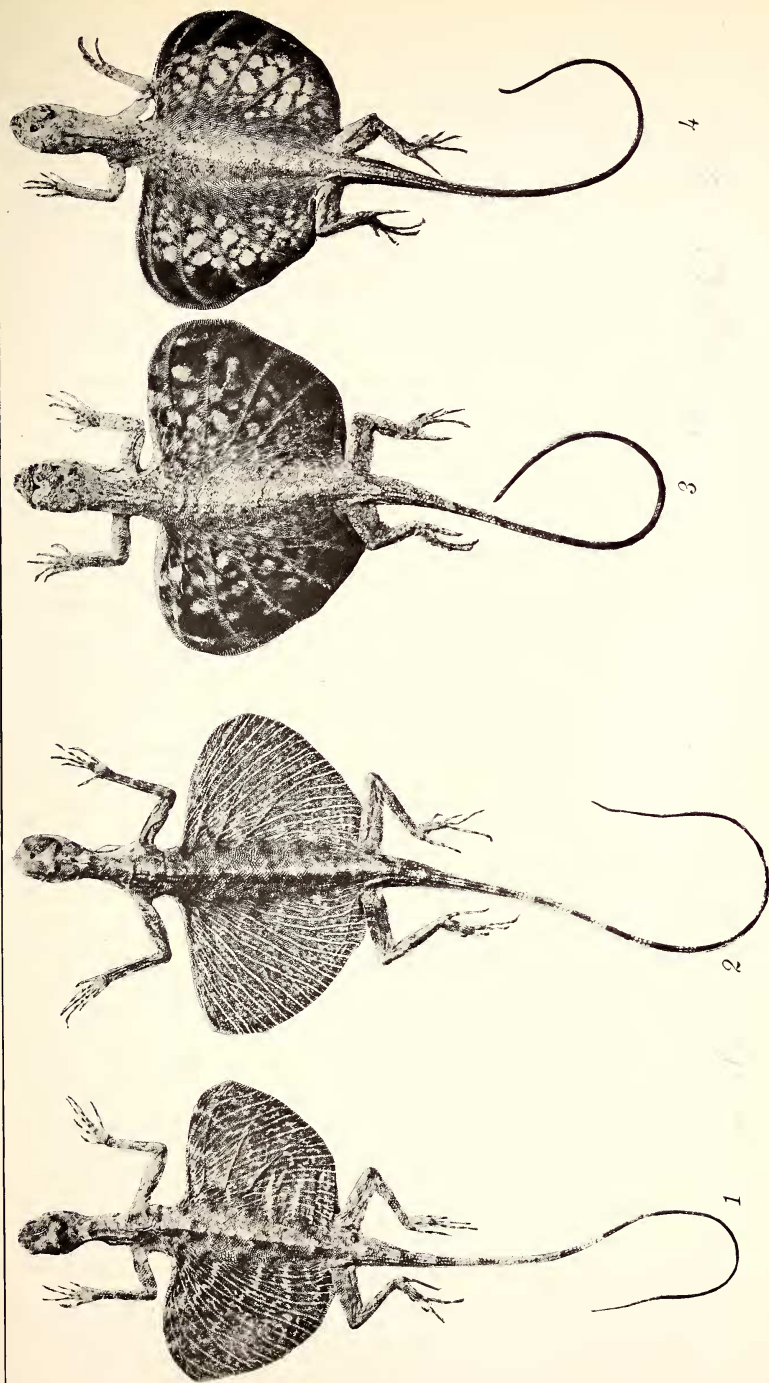


PLATE 7. PHILIPPINE DRACOS.

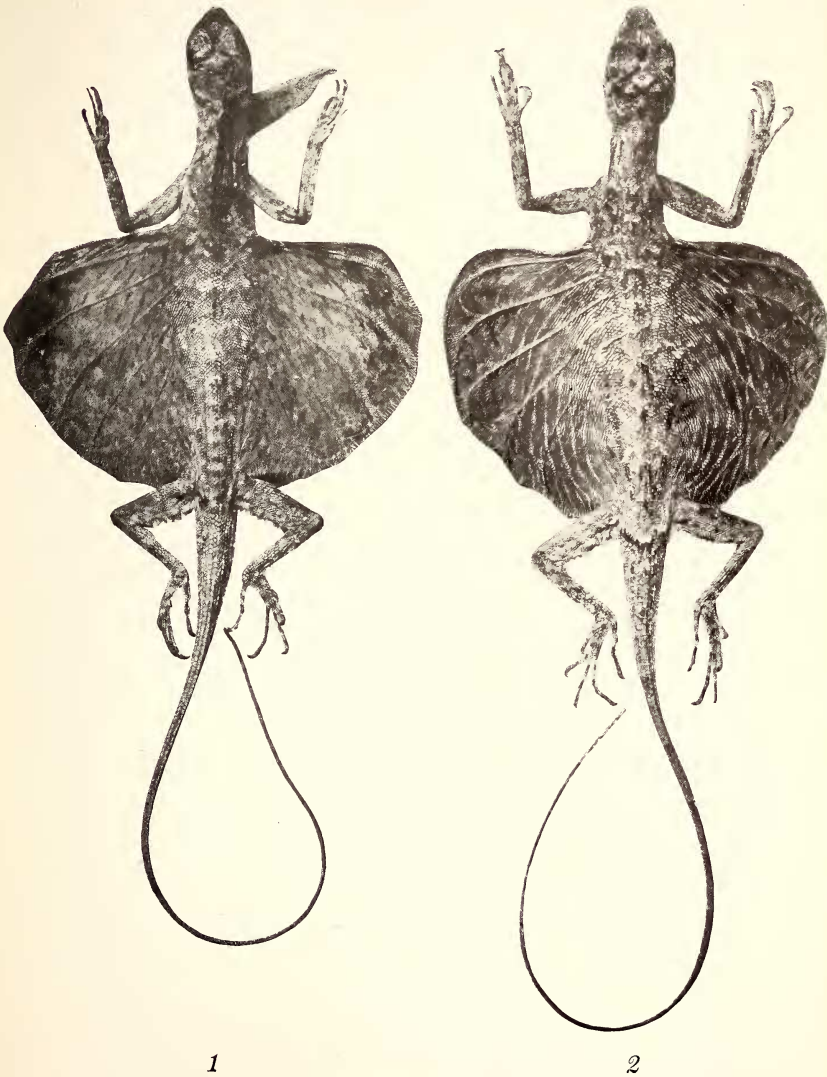
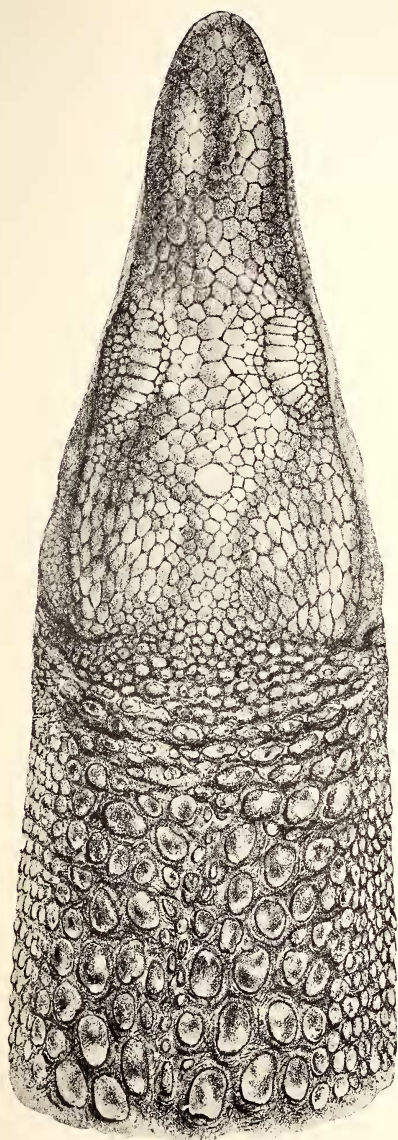


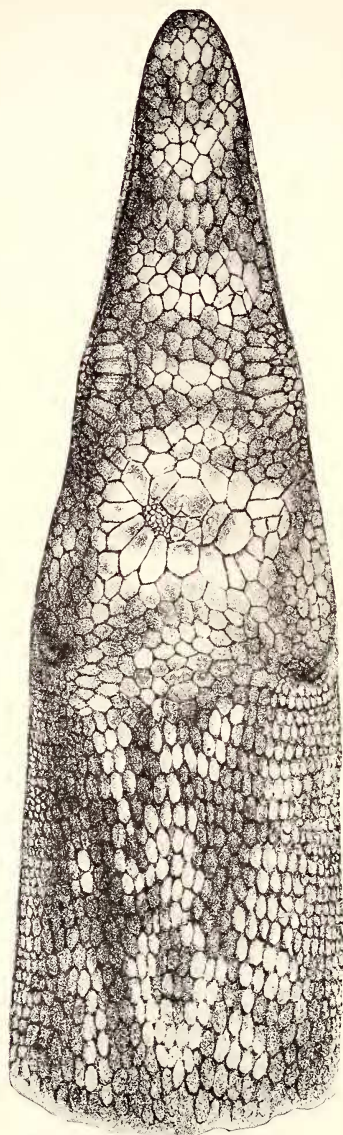
PLATE 8. DRACO QUADRASI BOETTGER.



PLATE 9. GONYCEPHALUS INTERRUPTUS BOULENGER AND G. SOPHIÆ (GRAY).



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Fig. 1. *Varanus nuchalis* (Günther). 2. *Varanus cumingi* Martjn.

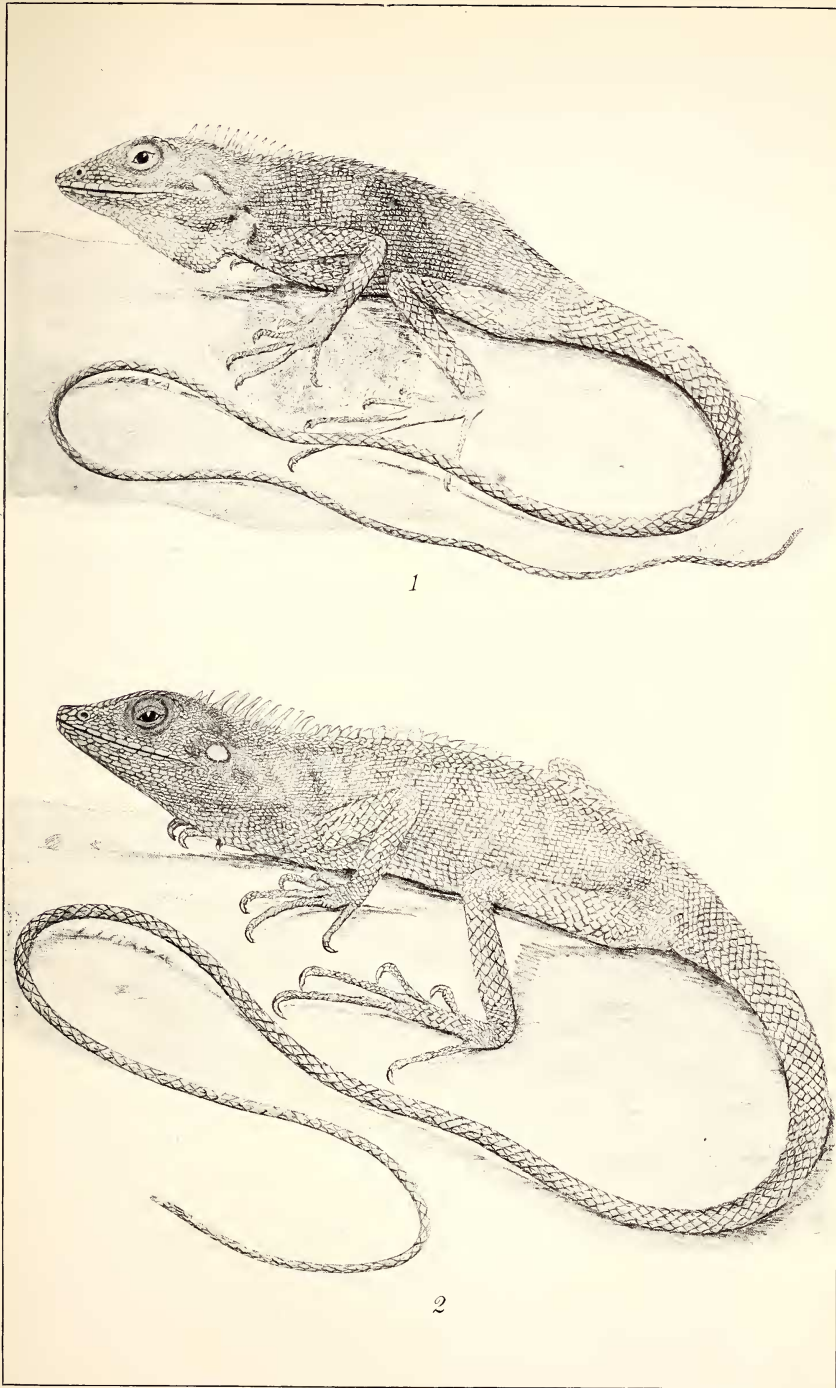


Fig. 1. *Calotes marmoratus sanchezi* subsp. nov. 2. *Calotes marmoratus* (Gray).

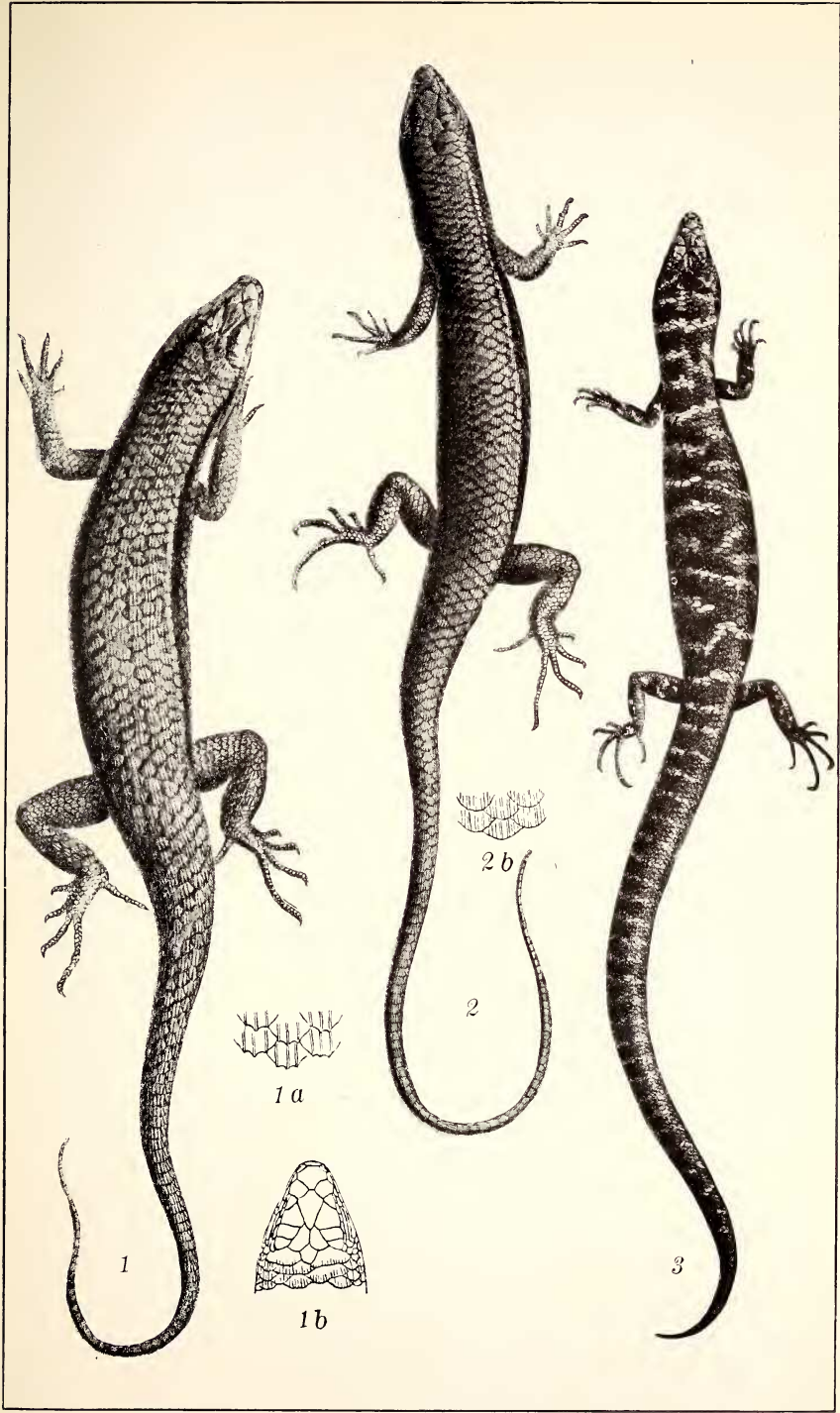


PLATE 12. PHILIPPINE LIZARDS.

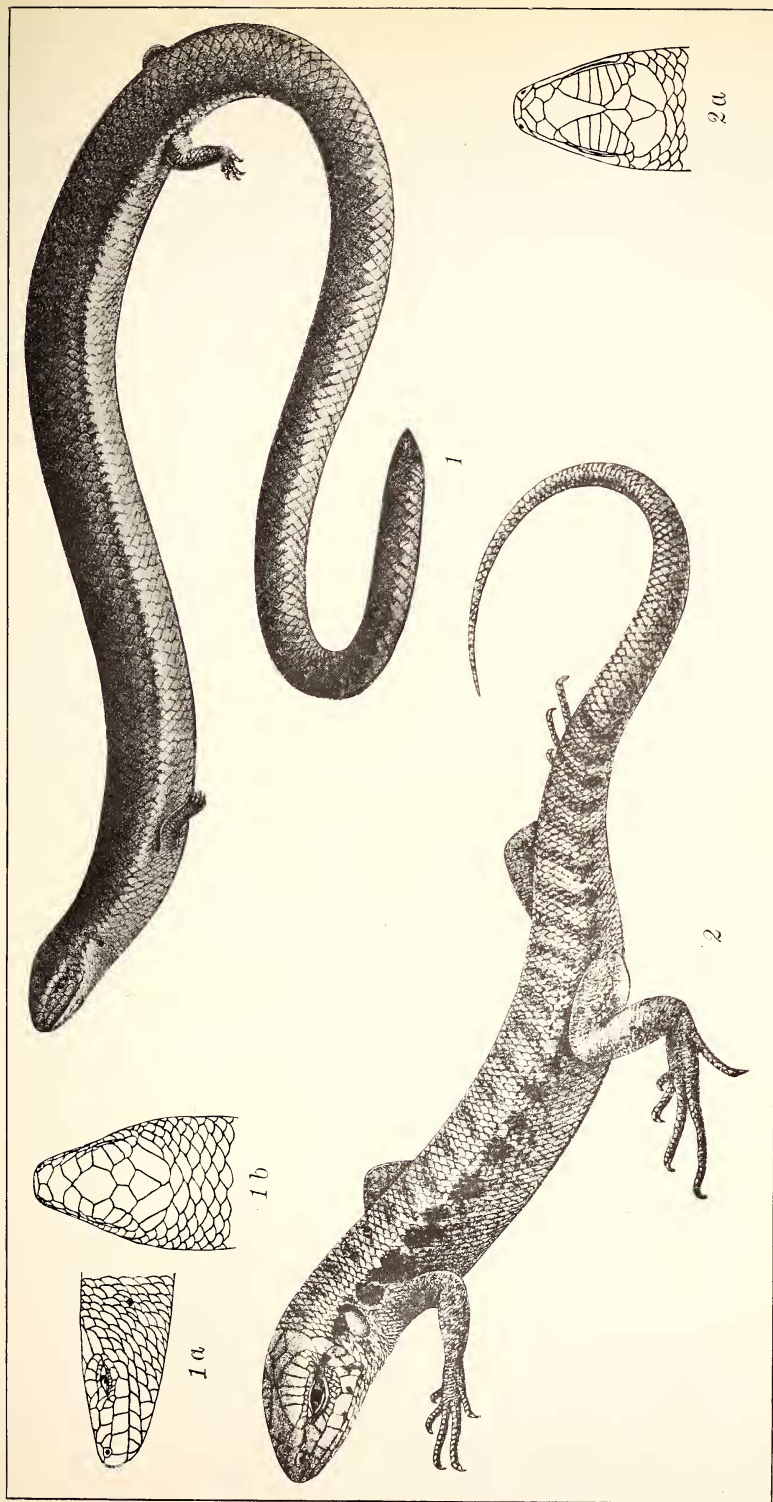
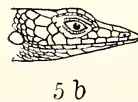
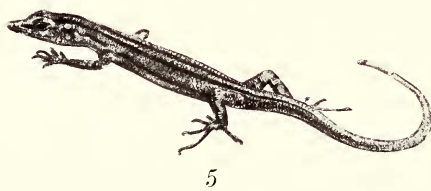


PLATE 13. BRACHYMELES BICOLOR (GRAY) AND OTOSAURUS CUMINGII GRAY.



PLATE 14. THREE SPECIES OF SPHENOMORPHUS.



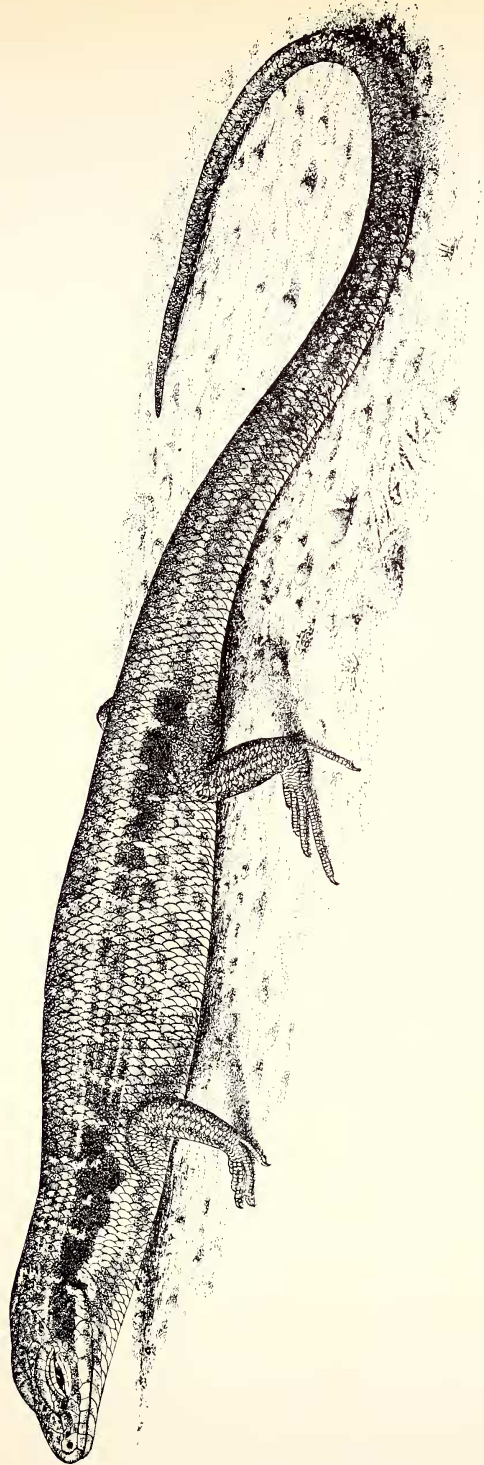


PLATE 16. SPHENOMORPHUS LLANOSI TAYLOR.

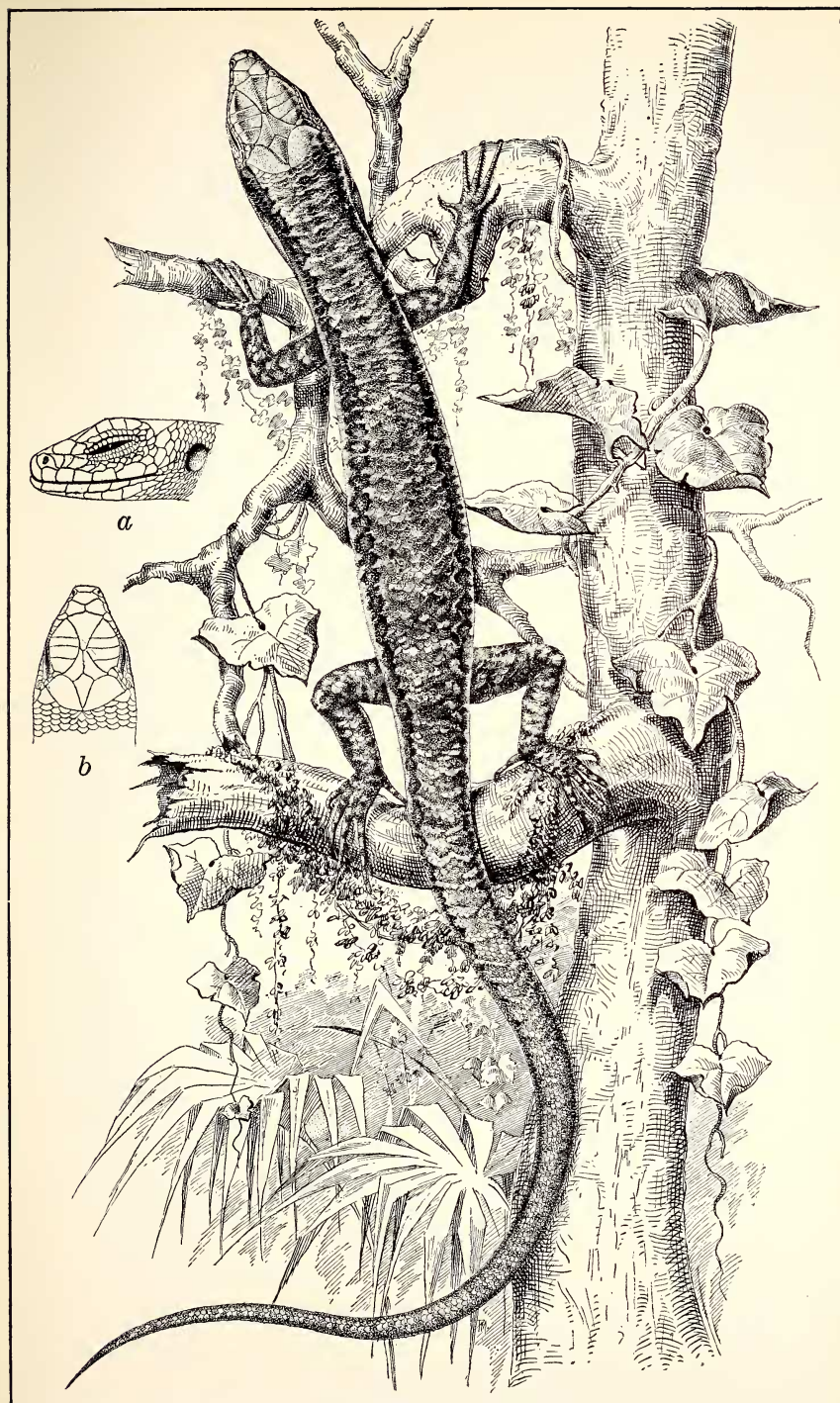


PLATE 17. SPHENOMORPHUS ARBORENS TAYLOR.



PLATE 18. PHILIPPINE LIZARDS.

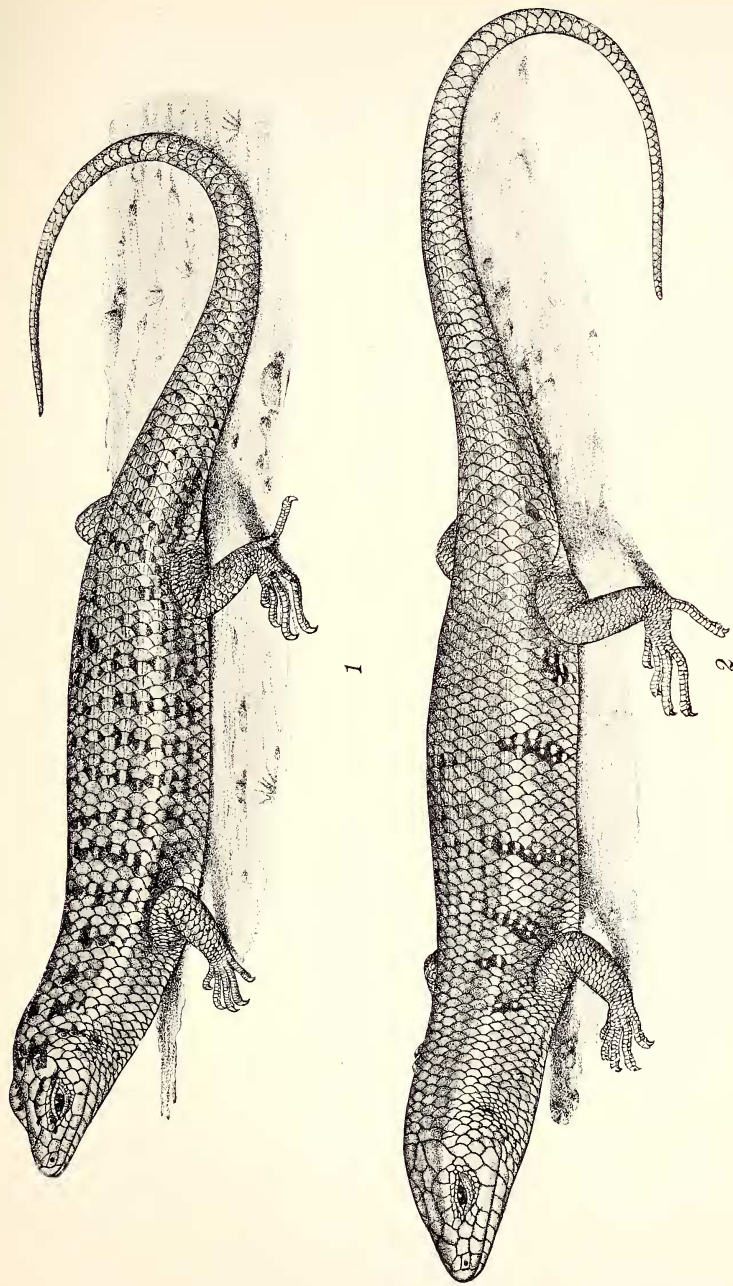


PLATE 19. *DASIA OLIVACEUM GRIFFINI* TAYLOR AND *D. OLIVACEUM SEMICINCTA* (PETERS).



PLATE 20. *DASIA SMARAGDINUM* (LESSON), VARIETIES.

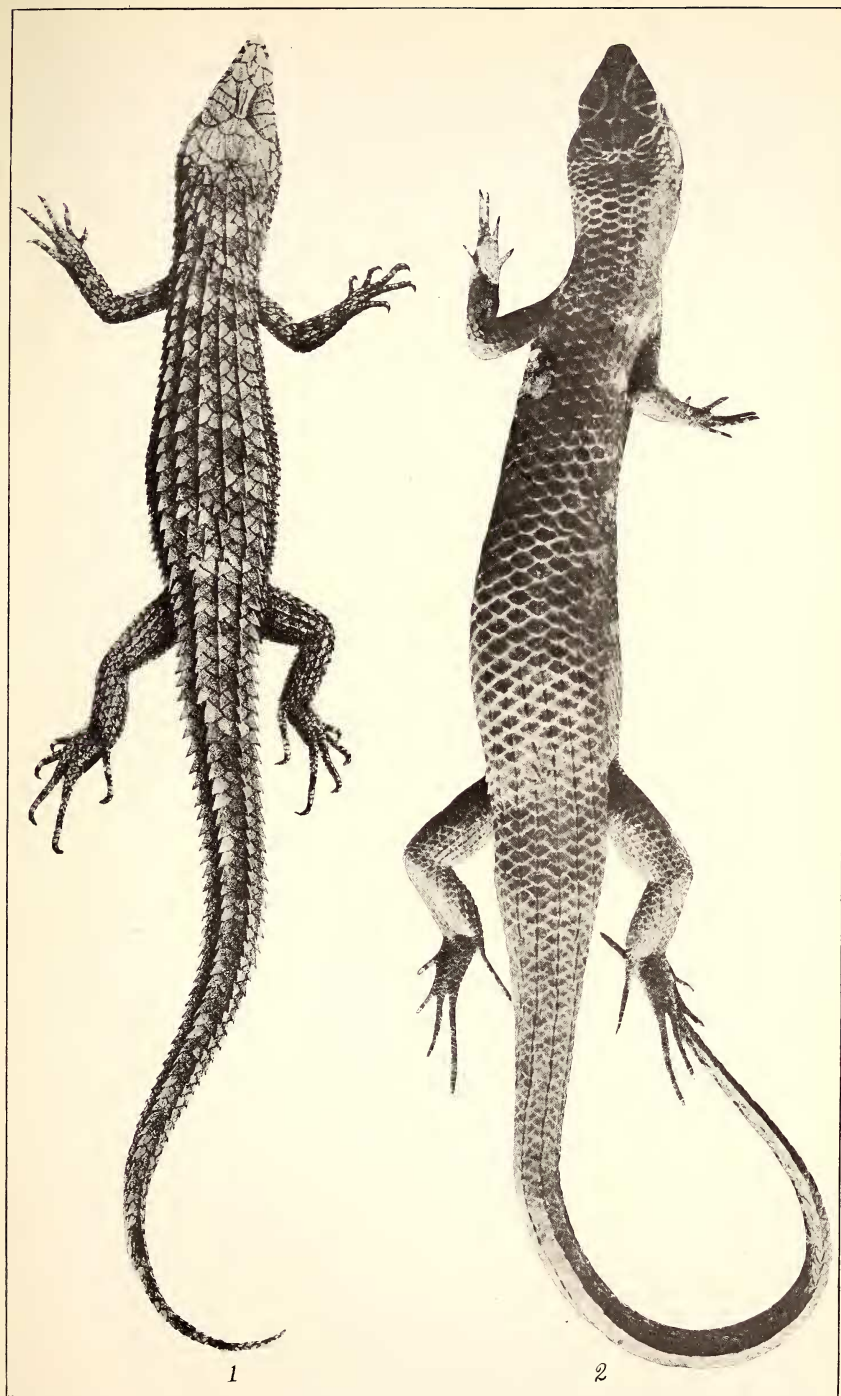
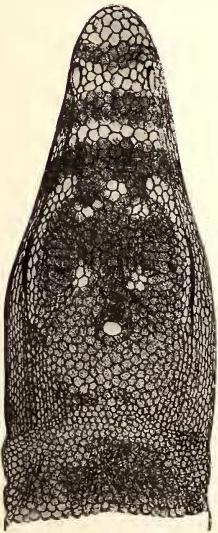


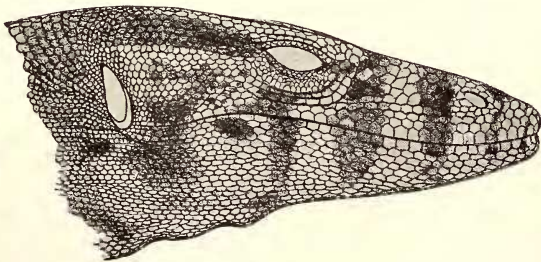
Fig. 1. *Tropidophorus grayi* Günther. 2. *Tropidophorus rivularis* Taylor.



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PLATE 23. VARANUS SALVATOR (LAURENTI).

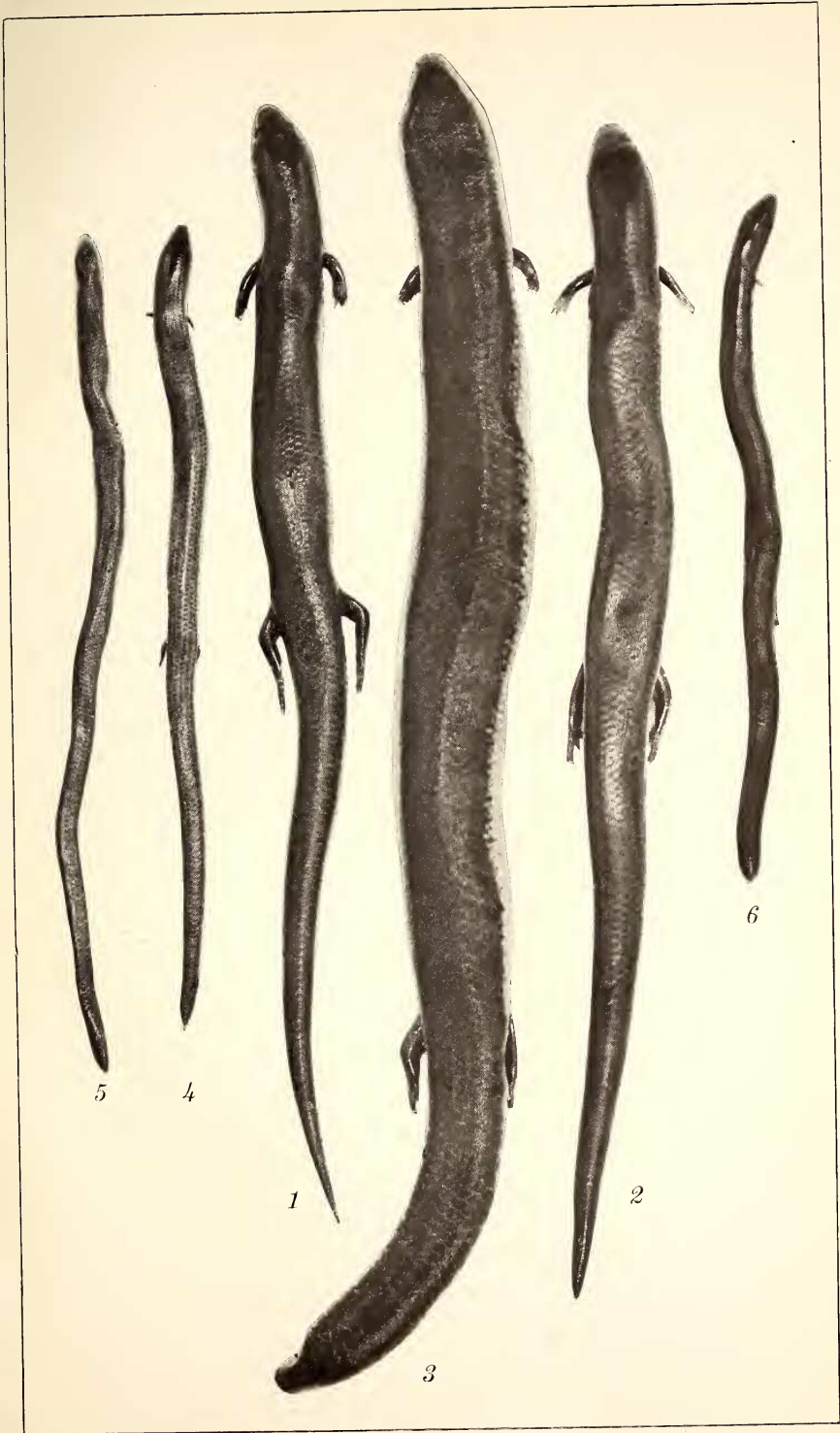


PLATE 22. SIX SPECIES OF THE GENUS BRACHYMELES.